

**eQ Controls**  
*Assembly and installation*



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**FläktWoods**

# Procedure

1. Identify components supplied separately against the enclosed bill of materials.
2. Fit external cable trunking (accessories), see page 14.
3. Connect the power and signal wiring to adjacent blocks, see page 15.
4. Connect sensors, actuators and accessories; see pages 12 and 17–31.
5. Connect the incoming supply, see pages 4–11.
6. Switch on the power. The control system starts.
7. Configure the control system using the display, see page 42–47.
  - a) Log in. Password: 2000
  - b) Current time
  - c) Fan setpoints
  - d) Temperature setpoints
  - e) Desired operating period
8. The air handling unit is ready for use.

**NOTE!** Prior to physical connection, air handling unit accessories not supplied with the unit, such as actuators, coolers and active sensors etc., must first be configured in the controller. Contact Fläkt Woods support for advice.

## Limits of responsibilities

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# Control equipment

Control panel, sizes 0.55-5.5 kW

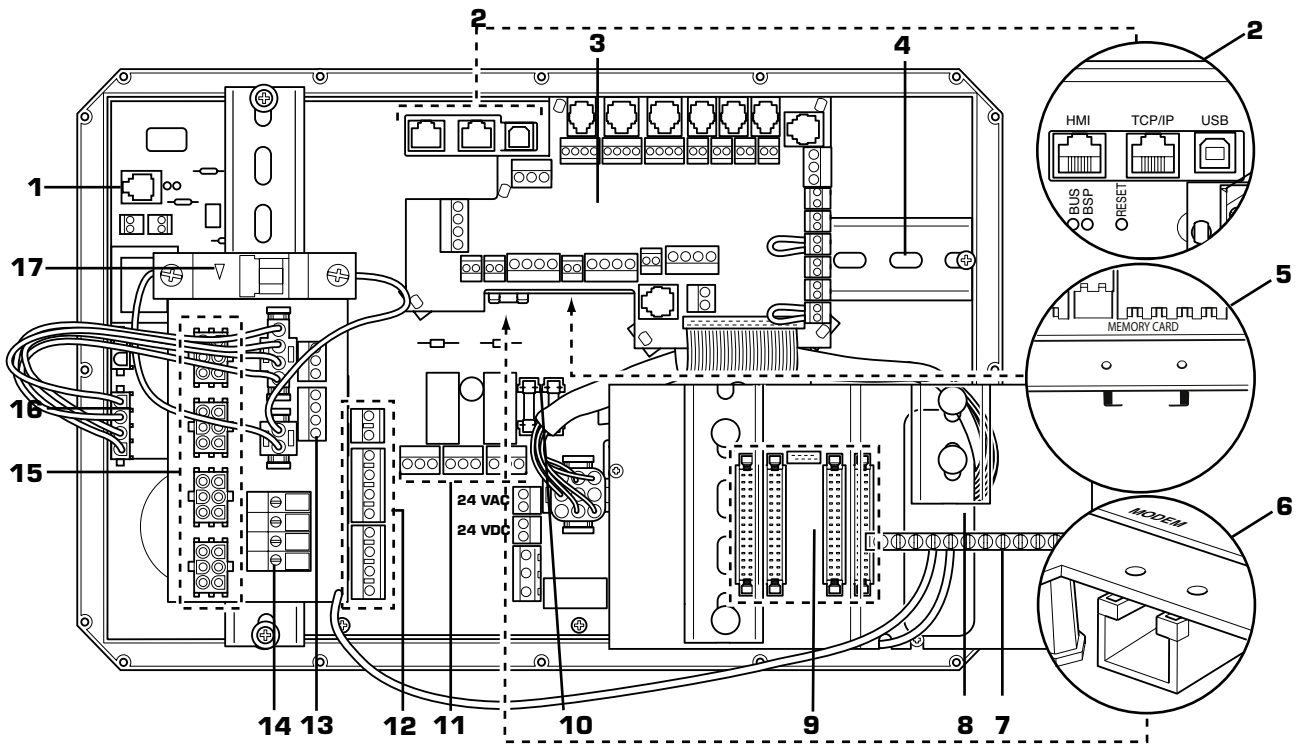


Fig. 1 Control panel, sizes 0.55-5.5 kW

## Electrical connections and currents, power units up to 5.5 kW

Connect the incoming supply to terminal block 14 (see the figure above) in the control panel. Connect the protective earth directly to the earthing bar, 7 (see the figure above). When the STAZ-81 energy analyser is supplied the incoming supply is connected directly to the energy analyser and strapped from the output side to screw terminal block 14 (see the figure above). Each incoming supply must be provided with a manually operated lockable main circuit breaker/load interrupter to conform to Machinery Directive 2006/42/EC and Standard EN 60204-1 Electrical equipment of machines. The load interrupter is available as a motor accessory (STAZ-80). The safety circuit breaker is available as an accessory (APAC). Protect the incoming power supply of the air handling unit with a fuse in accordance with current legislation in the country where the equipment is installed.

1. Connecting the lighting switch
2. Display connector, (HMI\*), Ethernet, USB
3. Circuit board with terminal blocks for accessories
4. Space for a communication module
5. SD card reader
6. Modem
7. Earthing bar
8. Transformer
9. Junction box connections
10. Glass fuses, power supply 24 VAC and 24 VDC
11. A and B alarm outputs/Run Ind
12. Start/Operation Heating/Cooling
13. Incoming supply for service lighting
14. Incoming supply, 0.55 kW–5.5 kW
15. Power supply, air handling unit loads, 3-phase.
16. Control panel electrical supply
17. Internal operation

\* It is also possible to connect the display via KNX (for example for outdoor units where longer cable is needed).

Please note that the response time decreases when using this connection.



## Control equipment

Control panel, size 7.5 and 11–15 kW

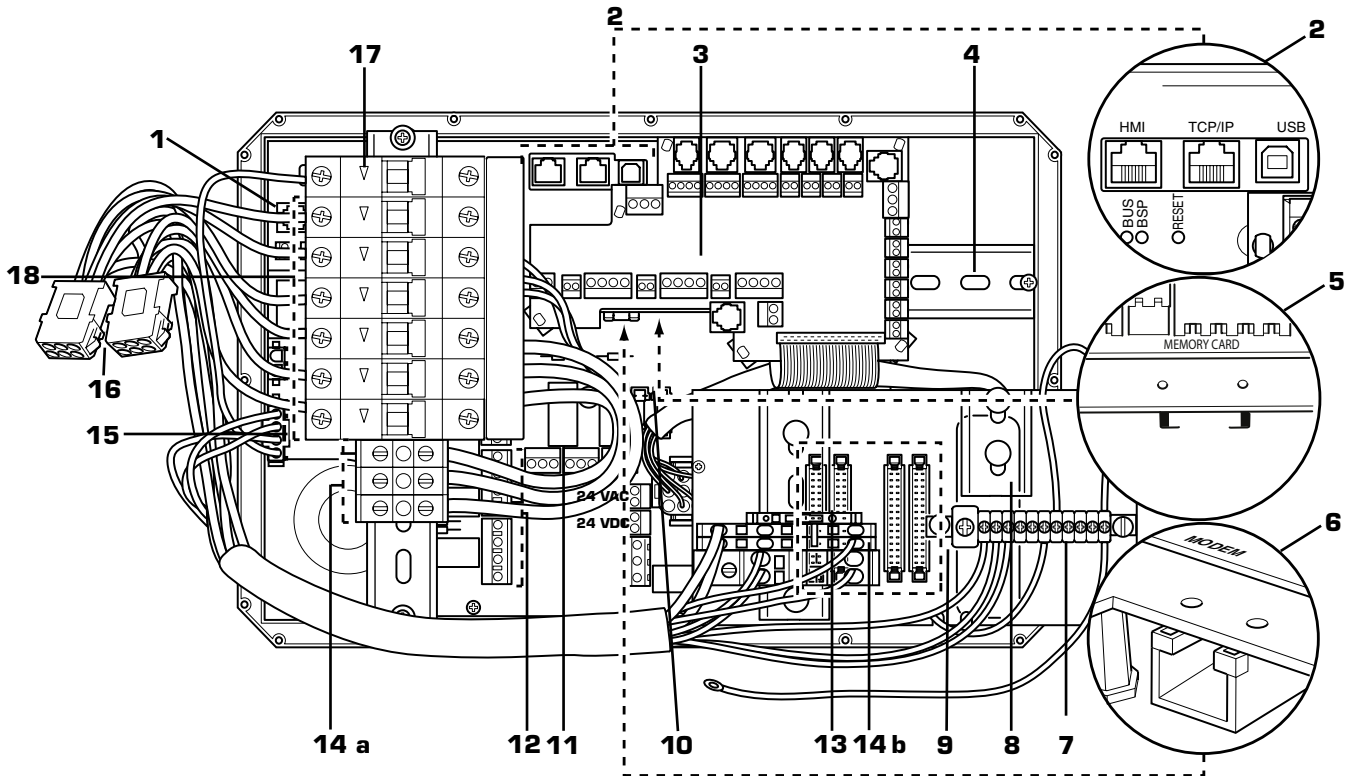


Fig. 2 Control panel, size 7.5 and 11–15 kW

### Electrical connections and currents, power units 7.5 kW and 11–15 kW

Connect the incoming supply to earth (7) - and neutral terminal block 14 b and phases L1, L2 and L3 to terminal block group 14 a (see the figure above) in the control panel. If the STAZ-81 energy analyser has been selected, connect the incoming supply directly to the energy analyser (see page 10). Connect the protective earth directly to the earthing bar, 7, (see the figure above).

Each incoming supply must be provided with a manually operated lockable main circuit breaker/load interrupter confirming to Machinery Directive 2006/42/EC and Standard EN 60204-1 Electrical equipment of machines. The load interrupter is available as an accessory (STAZ-80). The safety circuit breaker is available as a motor accessory (APAC). Protect the incoming power supply of the air handling unit with a fuse in accordance with current legislation in the country where the equipment is installed.

1. Connecting the lighting switch
2. Display connector, (HMI\*), Ethernet, USB
3. Circuit board with terminal blocks for accessories
4. Space for a communication module
5. SD card reader
6. Modem
7. Earthing bar
8. Transformer
9. Junction box connections
10. Glass fuses, power supply 24 VAC and 24 VDC
11. A and B alarm outputs
12. Start/Operation Heating/Cooling
13. Incoming supply for service lighting
14. Incoming supply, 7.5 kW–15 kW
  - a. Connecting phases
  - b. Connecting neutral
15. Control panel electrical supply
16. Power supply, air handling unit loads, 3-phase.
17. Internal manœuvre (read switch)
18. Air handling unit load short-circuit protection

\* It is also possible to connect the display via KNX (for example for outdoor units where longer cable is needed).

Please note that the response time decreases when using this connection.

## Control equipment (only for Norway)

### Electrical connections for Norway without transformer, (3x230 VAC)

The power unit can be used without a transformer in Norway where 3x230 VAC is used. However, the maximum motor load is lower for each power unit when using 3x230 VAC; see the table on page 11.

In this case use phase L2 as a virtual neutral. Strap between L2 and the neutral fuse on the incoming supply, see connecting on page 9, Fig. 7.

### Electrical connections for Norway with transformer, (3x230 VAC)

Connect the transformer as illustrated on the right. Connect the incoming supply 3x230 V to the primary side and the eQ (400 V) to the secondary side. Position the transformer so that it has proper ventilation. Maximum ambient temperature 40°C.

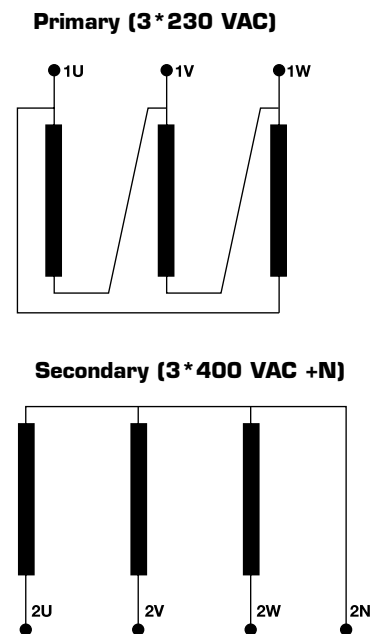


Fig. 3



## Control equipment

### Connecting the service power supply for lighting

All of the air handling unit's incoming power supplies must be preceded by a load interrupter in accordance with Machinery Directive 2006/42/EC. Load interrupters are available as accessories STAZ-80. In eQ units with integrated controls there are two options for providing service power for air handling unit lighting.

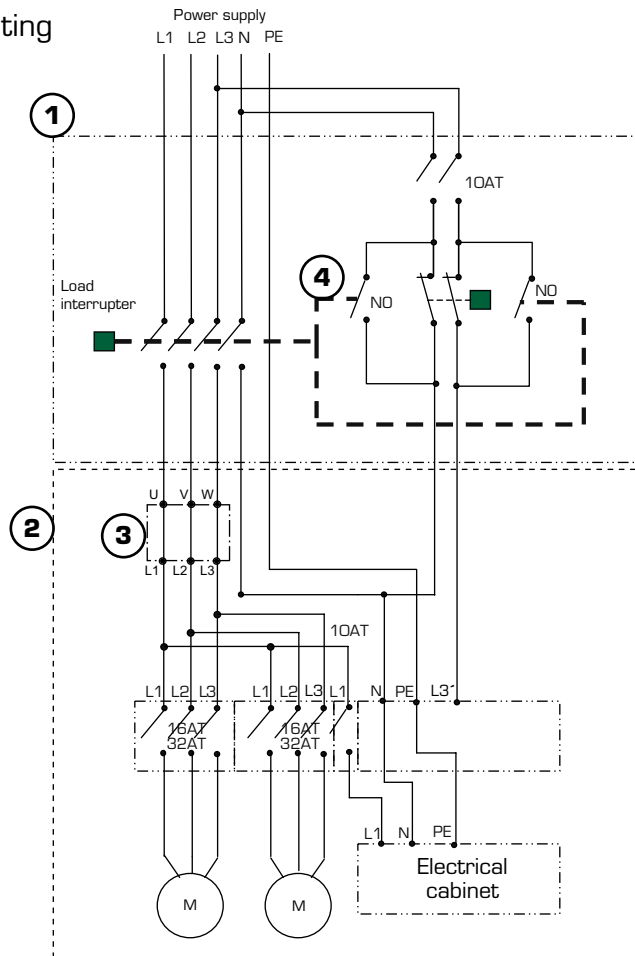
1. For power supplies up to 5.5 kW, a service power supply can be obtained by connecting L3 to L3' through a terminal block on the power unit in the control cabinet. This means that the entire air handling unit is turned off from all power when it is disconnected through the all pole load interrupter. See Fig. 5.
2. Separate power supply. This means that the air handling unit still has a service power supply when the all pole load interrupter is disconnected. See Figs. 4 and 6.

**⚠ Options 1 and 2 apply if the project's mains voltage is 3x400 VAC. If the project's voltage is 3x230 VAC, connect in accordance with point 2.**

In order to achieve service power that takes account of personal safety in point 2, when the air handling unit load interrupter is off, the service power must be supplied from the same group and provided with a 10 AT double-pole fuse group, and a ground fault interrupter in series. See Figs. 4 and 6.

If the load interrupter is switched off, service power is supplied through the residual current circuit breaker, and when the load interrupter is on, the ground fault interrupter is bypassed via the load interrupter auxiliary contacts.

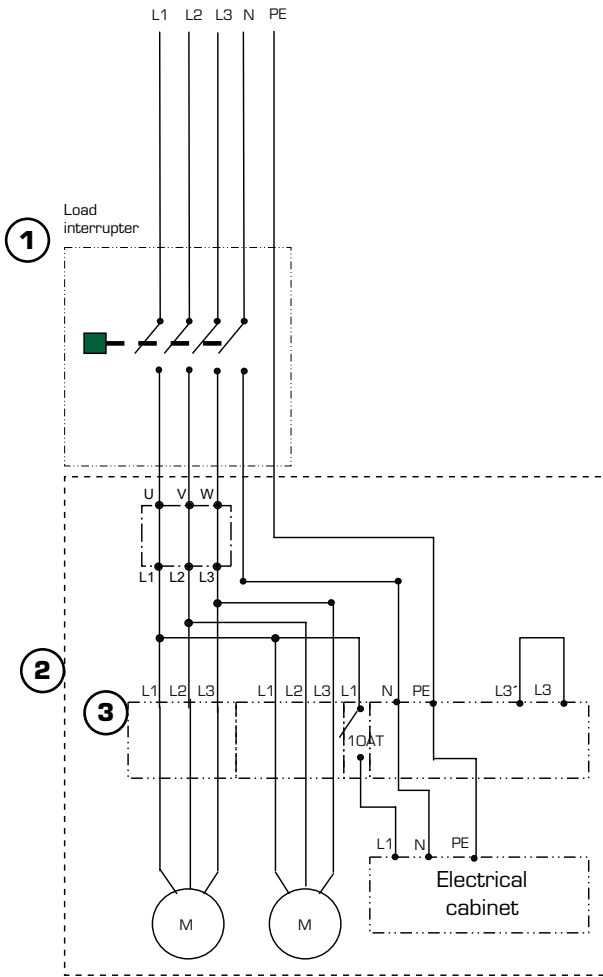
The service power supply must be connected in accordance with the enclosed wiring diagram. When disconnecting the load interrupter, switch off the double-pole automatic fuse first, and when the load has been disconnected the double-pole automatic fuse can be switched on again. The reverse procedure applies when switching on the load interrupter.



1. STAZ-80, load interrupter
2. eQ Air handling unit
3. Energy analyser/terminal block
4. Ground fault interrupter with automatic personal protection fuses

Fig. 4  
**3x400 VAC TN-S**  
 Separate service power supply via personal protection.

# Control equipment



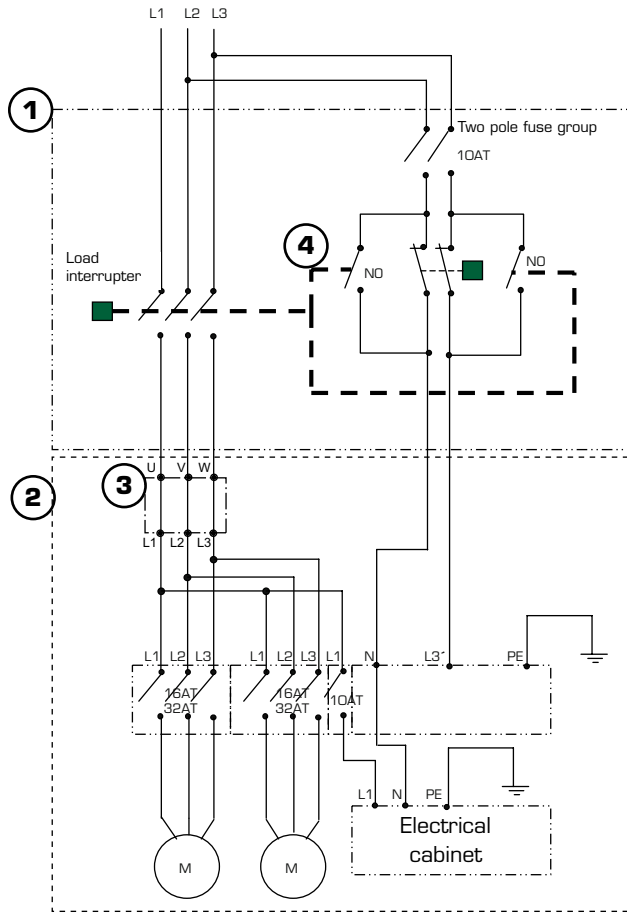
- 1. STAZ-80, load interrupter
- 2. eQ Air handling unit
- 3. Energy analyser/terminal block

Fig. 5

### 3x400 VAC TN-S

Connect the service power downstream of the load interrupter. This can only be done when engines up to 5.5 kW, or 25 A, are being supplied at the same time.

Only for Norway



- 1. STAZ-80, load interrupter
- 2. eQ Air handling unit
- 3. Energy analyser/terminal block
- 4. Ground fault interrupter with automatic personal protection

Fig. 6

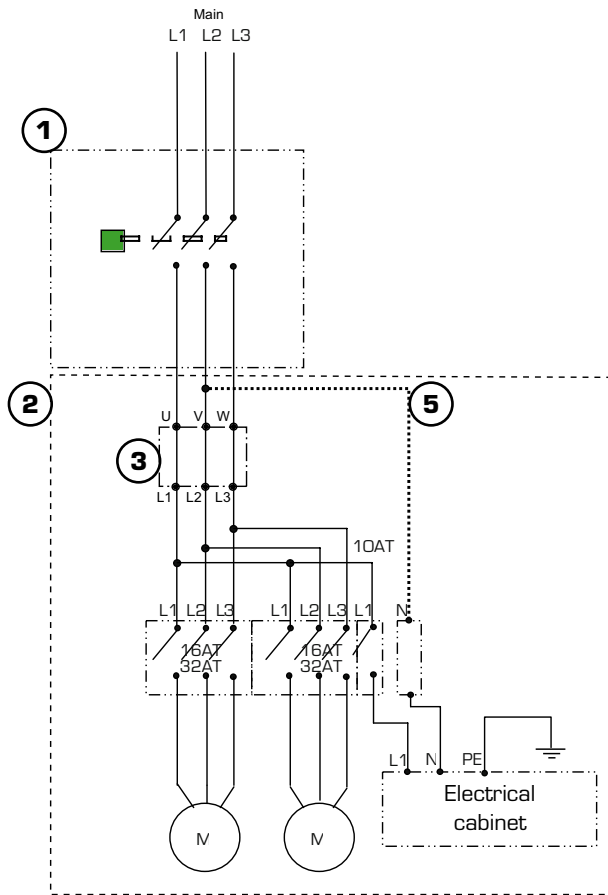
### 3x230 VAC IT

Separate service power supply via personal protection.



# Control equipment

Only for Norway



- 1. STAZ-80, load interrupter
- 2. eQ Air handling unit
- 3. Energy analyser/terminal block
- 5. Strapping L2 to N. Must be carried out by an electrical contractor.

Fig. 7

### 3x230 VAC IT

Connecting the service power downstream of the load interrupter is not permitted for 3x230 VAC.



## Control equipment

Connecting the energy analyser

Incoming phase	Energy analyser incoming terminal block	Energy analyser outgoing terminal block
L1 (U)	3	1
L2 (V)	6	4
L3 (W)	9	7

Cable dimensions and currents, 0.55 – 15 kW

Outputs, power unit, kW (3x400 VAC)	Maximum cross section of the internal motor cable, mm <sup>2</sup> (A)	Maximum cross section of the external electrical power supply, mm <sup>2</sup> (A)
0,55-5,5	2,5	4 (max. 25 A)
7,5	2,5	16 (max. 63 A)
11-15	6	25 (max. 80 A)

**Fuse protection for DX-cooling, electrical heating and ECONET is carried out separately.**

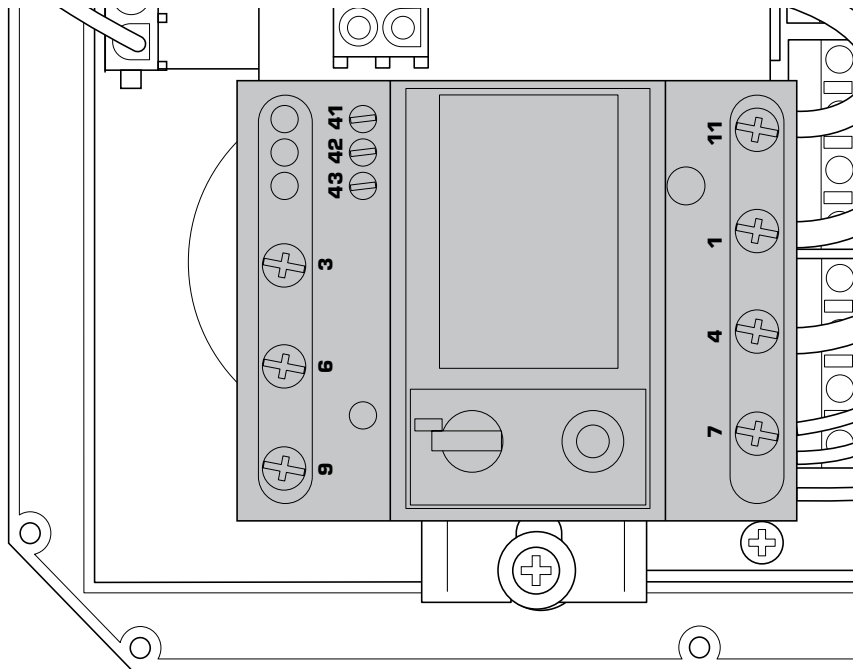


Fig. 8  
 Energy meters: Connecting L1 (U), L2 (V) and L3 (W).  
 Connect neutral (N) and earth (PE) to the specified terminal block.

## Control equipment

### Power consumption eQ

Output (kW)	Total		1 motor	
	3x230 V Current (A)	3x400 V Current (A)	3x230 V Current (A)	3x400 V Current (A)
0,55	7,6	4	3,3	1,5
0,75	10,2	5,8	4,6	2,4
1,1	14,2	7,6	6,6	3,3
1,2	-	4,6	-	1,8
1,5	16	9,2	7,5	4,1
1,7	-	6	-	2,5
2,2	24,6	11,8	11,8	5,4
3	-	14,8	-	6,9
3,1	-	10,8	-	4,9
4	34,4	18,6	16,7	8,8
5,5	49,4	25	24,2	12
7,5	62,6	32	30,8	15,5
11	-	47	-	23
15	-	63	-	31

When ordering the load interrupter (STAZ-80), specify the total power consumption.

Total current is calculated in accordance with the example below.

$$\begin{aligned}
 & \text{Supply air fan power consumption} \\
 & + \text{Extract air fan power consumption} \\
 & + \text{Other power consumption approx. 1 A} \\
 & \hline
 & = \text{Total power consumption (bbb in STAZ-80)}
 \end{aligned}$$

#### Example:

For a 3x400 V air handling unit with a 7.5 kW supply air fan and 4 kW extract air fan. The power consumption for each fan can be read off from the table above.

$$\begin{aligned}
 & 15,5 \\
 & \hline
 & + 8,8 \\
 & \hline
 & + 1,0 \\
 & \hline
 & = 25,3
 \end{aligned}$$

The size of the load interrupter depends on the total power consumption.

## Control equipment

### Connecting sensors and accessories, size 0.55-15 kW

External components can be easily connected to the eQ unit through a quick connector or wires to a screw terminal block in the control cabinet.

Then the cable is routed through the cellular plastic strip on the air handling unit and secured to the adjacent mounting rail. When all cables have been connected to the terminal

block, fit the control panel cover and secure it using the screws supplied.

The cellular plastic, which is semi-elastic, will slowly adapt to the shape of the cables thus sealing the lead-in.

The following paragraphs provide information about how to install and connect the various sensors and accessories.

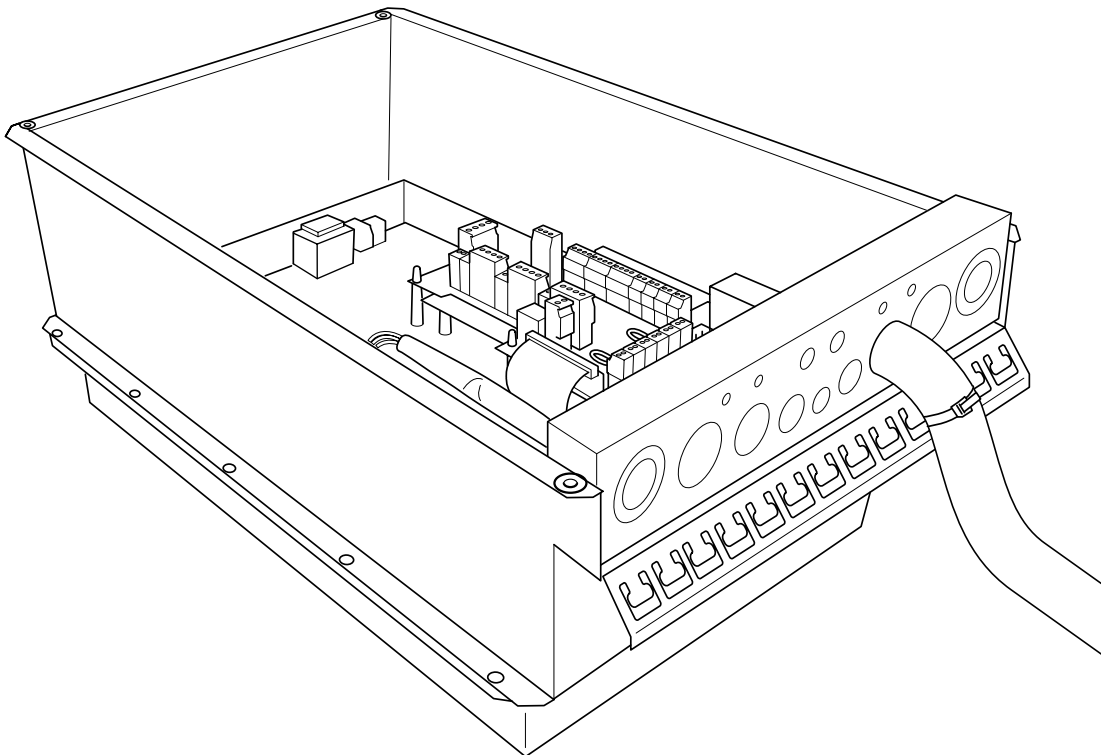


Fig. 9

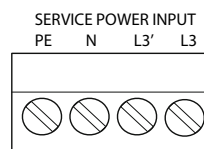
**Tip:** The frame of the control panel can be turned so that the mounting rail faces downwards on outdoor units and upwards on indoor units where the incoming supply comes via a ceiling mounted cable ladder.

## Control equipment

### Lighting control in the control panel

The air handling unit lighting is controlled by a switch mounted on the cover of the control panel on the air handling unit. The switch is connected to a quick connector in the control panel.

### Connecting power supply lighting, 3x400 V



Only applies to 5.5 kW power units

Connect the power supply for the air handling unit lighting via the terminal block on the power unit, see page 4–5. For 5.5 kW power units, L3 and L3' are strapped on the terminal block for the lighting power supply via the air handling unit power supply. For 7.5 and 11–15 kW power units, L3 and L3' are strapped downstream of the fuse, see pages 4–5. Note that in this case the lighting power supply is also cut when the air handling unit power supply is cut. Connect the external power supply to the lighting in accordance with the wiring diagrams on pages 7–9. This allows lighting even when the power to the air handling unit is cut.

## Control equipment

### Fitting cable trunking

1. Mount brackets on the lower edge of the relevant block, see image 1 below.
2. Mount the cable trunking.
3. Screw the cable trunking into place using self-tapping screws in the internal centre slot in the cable trunking opposite the bracket, see image 3.

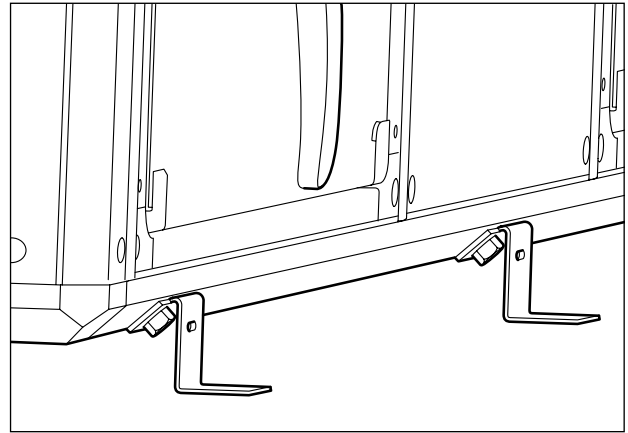


Image 1. Mount the brackets.

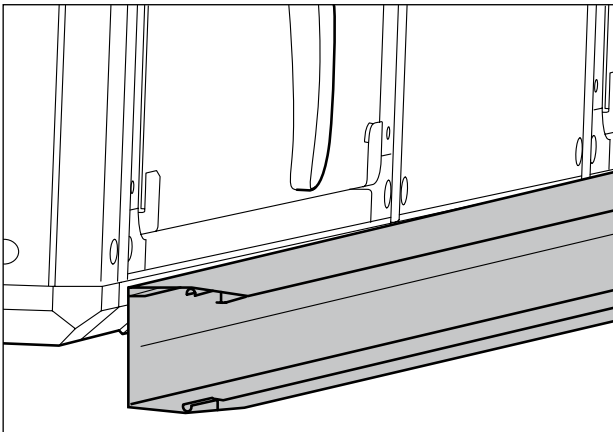


Image 2. Mount the cable trunking.

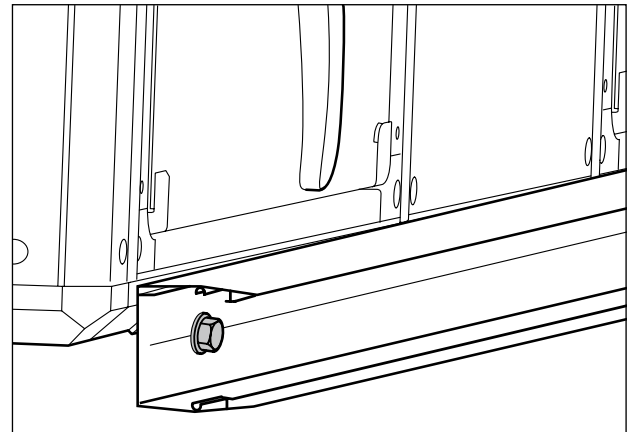


Image 3. Screw the cable trunking into place.

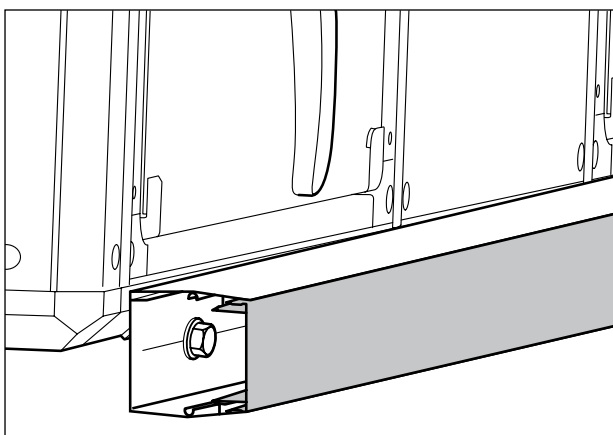


Image 4. Fit the front piece.

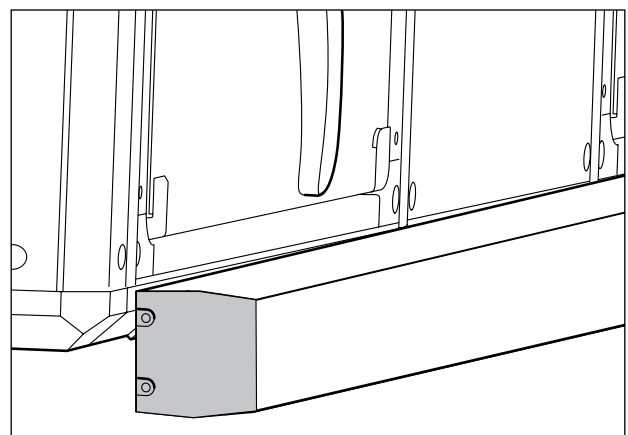


Image 5. Fit the end covers.

## Control equipment

### Electrical connection of units in blocks

When the separate air handling units have been mechanically docked the blocks must be connected electrical. Connect the signal cables to the distribution board in the cable trunking or junction box. Connect the cabling to (pos. 3, see page 16) and the screen to the adjacent pins, see the figure below. In the same way connect the power

cabling to the distribution connection in the cable trunking or junction box. The appearance and function of the junction depends on whether power is to be routed to further blocks or other loads, e.g. fan motors. Connect the 4-pole contact to the signal board (pos. 12, see page 16).

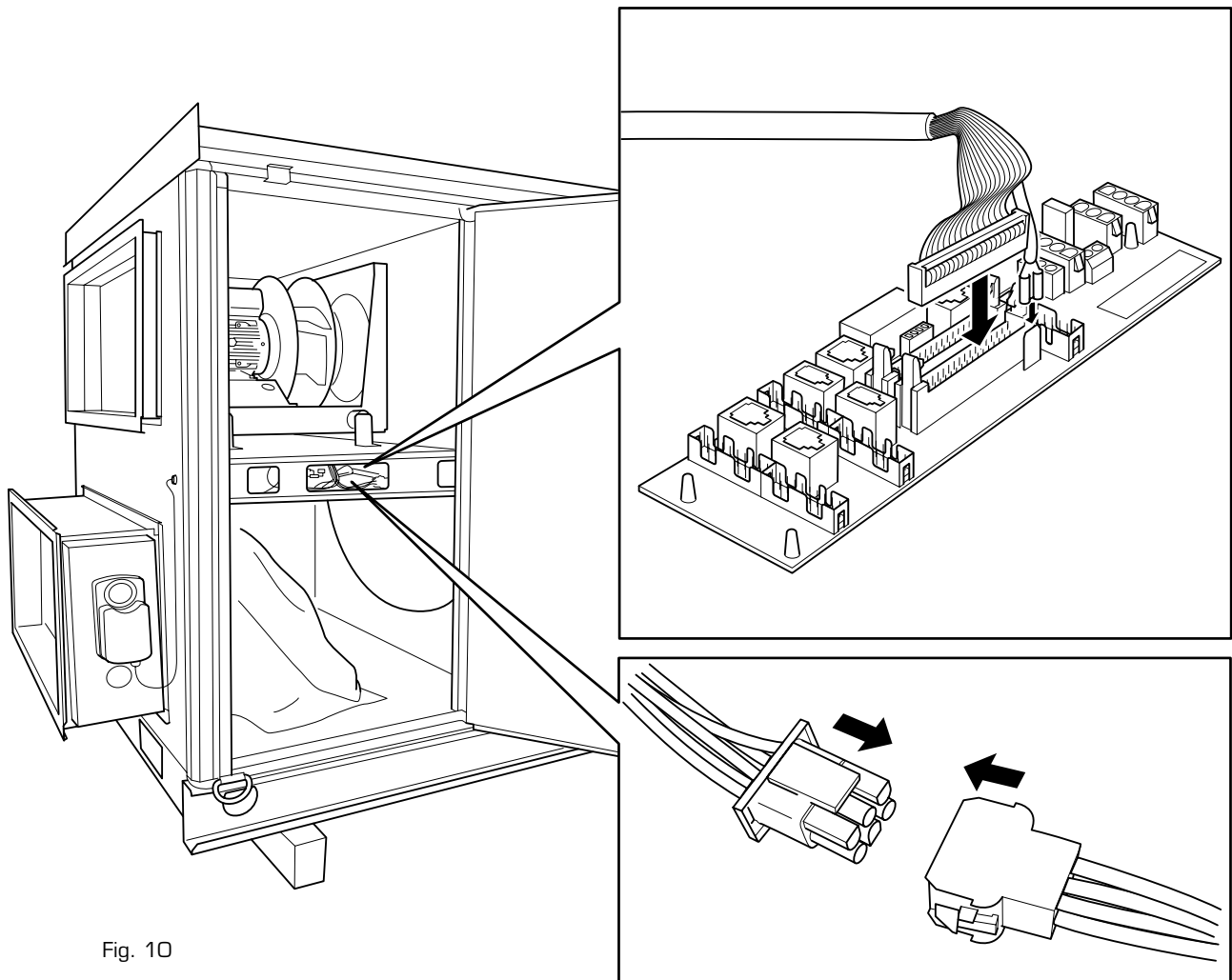


Fig. 10



# Control equipment

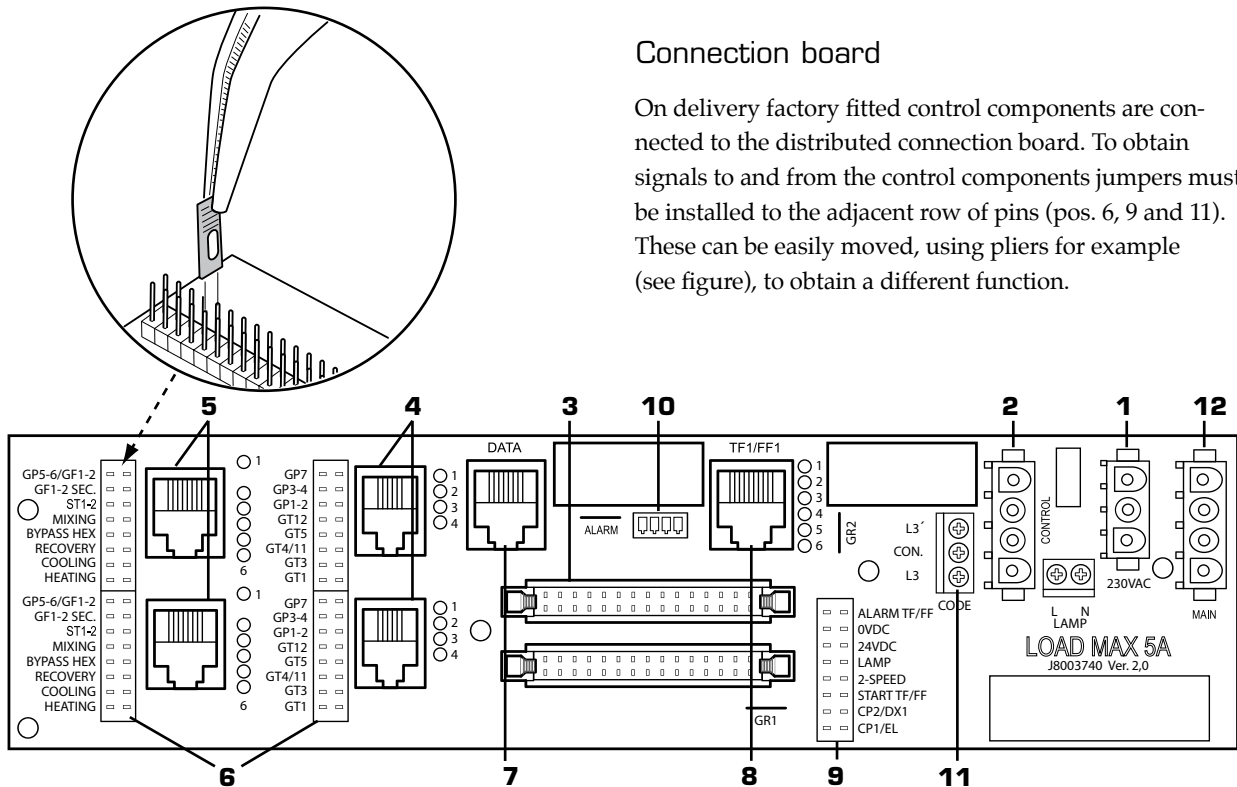


Fig.11 Connect sensors and power supply through the cable trunking

## Connection board

On delivery factory fitted control components are connected to the distributed connection board. To obtain signals to and from the control components jumpers must be installed to the adjacent row of pins (pos. 6, 9 and 11). These can be easily moved, using pliers for example (see figure), to obtain a different function.

- |   |   |
|---|---|
| <ol style="list-style-type: none"> <li>1. Constant power supply 230 VAC, max. 5A             <ul style="list-style-type: none"> <li>• Rotary heat exchanger</li> </ul> </li> <li>2. Control signal from relay, see also pos. 11 and 9             <ul style="list-style-type: none"> <li>• Electric heater</li> <li>• Cooler, heat pump</li> <li>• Lighting</li> <li>• Fan start, high speed</li> </ul> </li> <li>3. Signal distribution, incoming/outgoing including the adjacent earth pin</li> <li>4. Passive sensors and monitors             <ul style="list-style-type: none"> <li>• GT7 Heat exchanger pressure monitor</li> <li>• GT3-4 Fan/flow monitors</li> <li>• GT1-2 Filter monitors</li> <li>• GT12 Extract air sensor</li> <li>• GT5 Frost protection sensor</li> <li>• GT4 Temperature: cold corner, exhaust air, degree of efficiency supply air</li> <li>• GT3 Outdoor air temperature</li> <li>• GT1 Supply air temperature</li> </ul> </li> <li>5. Control signals and active sensors             <ul style="list-style-type: none"> <li>• GP5-6/GF1-2 Flow transmitter (standard)</li> <li>• GF1-2/L.TF/FF Flow transmitter*</li> <li>• ST1-2 Damper actuator on/off (including spring return mechanism)</li> <li>• Mixing Modulating damper actuator</li> <li>• Bypass HEX Aux</li> <li>• Recovery Heat exchanger</li> <li>• Cooling Cooler</li> <li>• Heating Electric heater, heat pump</li> </ul> </li> </ol> | <ol style="list-style-type: none"> <li>6. Row of pins for selecting function on terminals 4 and 5</li> <li>7. Internal communication bus             <ul style="list-style-type: none"> <li>• Preheater</li> </ul> </li> <li>8. Signals to frequency converter, integral motor etc.</li> <li>9. Row of pins for selecting digital functions             <ul style="list-style-type: none"> <li>• Alarm TF/FF Alarm frequency converter (pos. 8)</li> <li>• 0 VDC Aux</li> <li>• 24 VDC Aux</li> <li>• Lamp Lighting (pos. 2)</li> <li>• 2-speed High speed (pos. 2)</li> <li>• Start TF/FF Directly started fan (pos. 2)</li> <li>• CP2/DX1 Cooler, heat pump (pos. 2)</li> <li>• CP1/EL Electric heater (pos. 2)</li> </ul> </li> <li>10. Alarm             <ul style="list-style-type: none"> <li>• Electric heater</li> <li>• Cooler, heat pump</li> <li>• Thermo-contact trip/thermistor</li> </ul> </li> <li>11. Row of pins for selecting voltage pos. 2             <ul style="list-style-type: none"> <li>• Service power Lighting <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/></li> <li>• L3 Electric heaters, fan start cooler, heat pump <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/></li> </ul> </li> <li>12. Incoming supply, control board: 230 VAC</li> </ol> |
|---|---|

\* Alternative location of flow transmitters for air handling units with pressure control and flow display.





# Control equipment

## Temperature sensor

The temperature sensors included, and where they should be located, is shown in the list of components and the flow chart in the drawing documentation.

Connect all external temperature sensors to the control panel via quick-fit connectors. The room sensor and exterior wall sensor are supplied without cables, but the other temperature sensors are supplied with fitted cables and quick connectors to the terminal block. The supply air sensor, room sensor, exterior wall sensor and the freeze protection sensor are supplied with the unit but not installed, while the other temperature sensors are factory fitted in the air handling unit. Obviously these must be moved if the flow direction on the unit is changed, or if the air handling unit is converted. The supply air temperature sensor (GT1) should be fitted in the supply air duct, approximately 1.5 m from any duct heaters, to give stable measurement values.

The outdoor temperature sensor (GT3) for installation on the facade, is installed centrally on an outside wall, at least 2.5 m from the ground, on the building in which the temperature is to be controlled. The sensor should not be exposed to morning sun or installed above a window,

door or other heat sources. Install the sensor on a wall that faces north if possible.

The room temperature sensor (GT2) is intended for placement on an interior wall in the room where the temperature is to be controlled. The sensor should be positioned in an area with good air circulation and it should not be exposed to direct sunlight.

The frost protection sensor (GT5) is to be installed on the heater return pipe when using clamp on sensors and in the metering socket on the return pipe when immersion sensors are used. To obtain the correct measured values, the heat-conducting paste supplied must be applied to the return pipe when the clamp on sensor is secured onto the return pipe using cable ties.

Terminal block	Component
GT1	Supply air temperature sensor
GT2	Room temperature sensor
GT3	Outdoor air sensor
GT5	Frost protection sensor
GT12	Extract air temperature sensor
Z	Efficiency sensor/external set point/heat exchanger pressure monitor

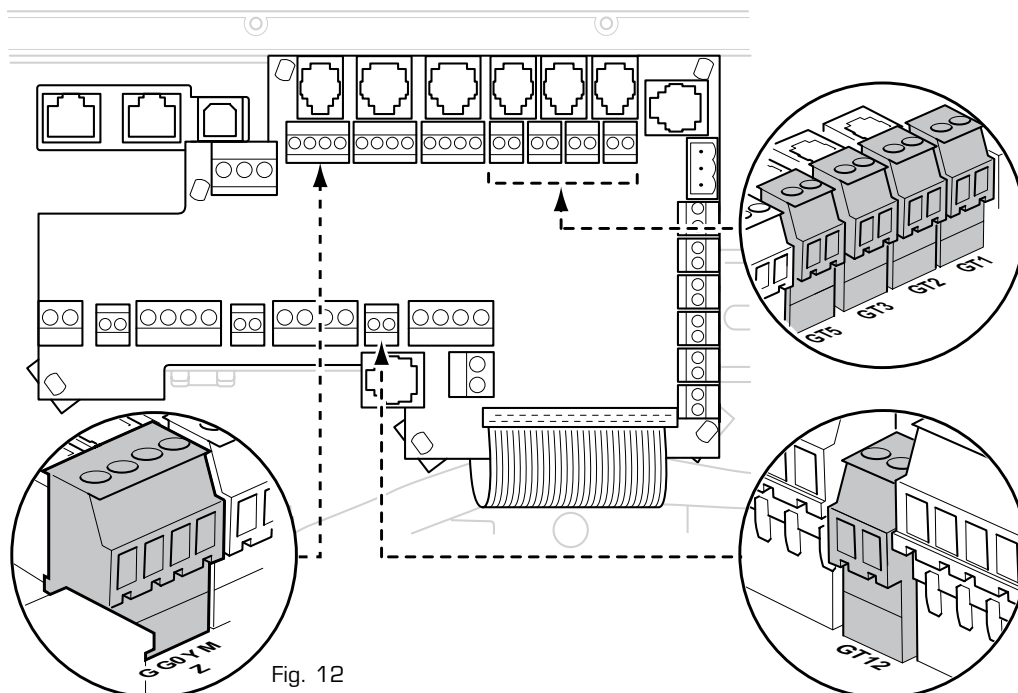


Fig. 12

## Control equipment

### Pressure/flow sensor, DPT1000/3000/5000/7000

The pressure sensor is supplied as a separate accessory. If pressure control is used, the air pressure in the index duct is controlled (the duct with the highest pressure drop and where the static pressure is the lowest). The first branch in the duct system is usually the index duct. The pressure sensor is located at the beginning of this duct. Position the extract air sensor, GP6, in an appropriate position with a representative pressure in the extract air duct. The flow sensors are always fitted, even with pressure control.

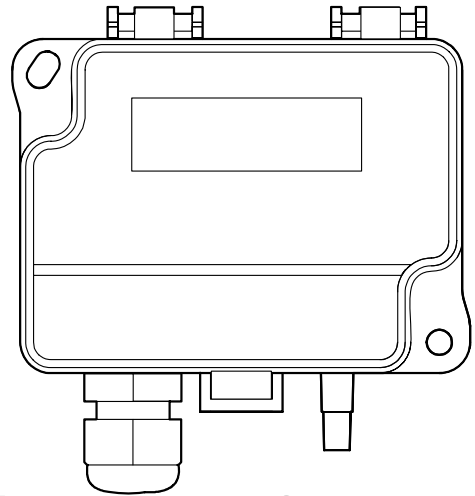


Fig. 13

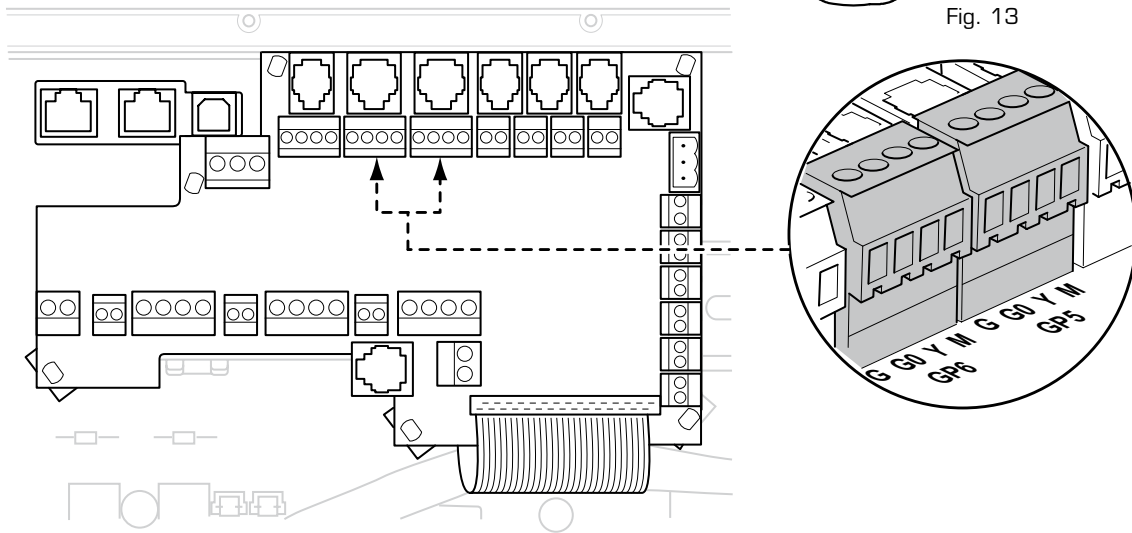


Fig. 14

### Wiring (pressure control)

Location	Terminal block	Connection	Pressure sensor
Supply air duct	GP5	Y	0-10V
		M	GND
		GO	GND
		G	24VDC
Extract air duct	GP6	Y	0-10V
		M	GND
		GO	GND
		G	24VAC

The pressure hose connected to the sensor must have an inner diameter of 4 mm.

### Flow control

The flow sensors are always installed, connected and configured. The sensors are connected to the connection board for each fan.

### Pressure control, supply air with slave-controlled extract air

The pressure sensor for the supply air is connected in the same way as for pressure control, see above. The flow sensors are always installed, connected and configured.

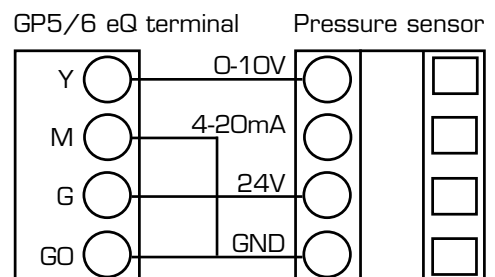


Fig. 15

# Control equipment

## Configuration of the sensor

Where the pressure range must be changed on the sensor, do this in accordance with the figures below.

Jumpers:

Response time	0,8s	4s
Jumper 1		

Pressure range	1	2	3	4
Jumper 2				
Jumper 3				

**NOTE!** A black field indicates a strapped connection.

Model	Pressure range 1	Pressure range 2	Pressure range 3	Pressure range 4
DPT1000 -R4	250Pa	500 Pa	750 Pa	1000Pa
DPT3000 -R4	750Pa	1500Pa	2250Pa	3000Pa
DPT5000 -R4	1250Pa	2500Pa	3750Pa	5000Pa
DPT7000 -R4	1700Pa	3500Pa	5250Pa	7000Pa

**NOTE!** The new pressure range must be entered into the controller when changing the pressure range on the sensor, irrespective of whether the pressure or flow is being controlled. Read about this in the controller manual.

## Zero point-calibration

**NOTE!** The sensors must be zero calibrated during commissioning. They should then be zero calibrated annually.

The sensors should have been energized for approximately five minutes before calibration is carried out. After that, remove the hoses from the sensors. To start calibration, press the button below the dip switches, see the figure. Release the button when the LED lights.

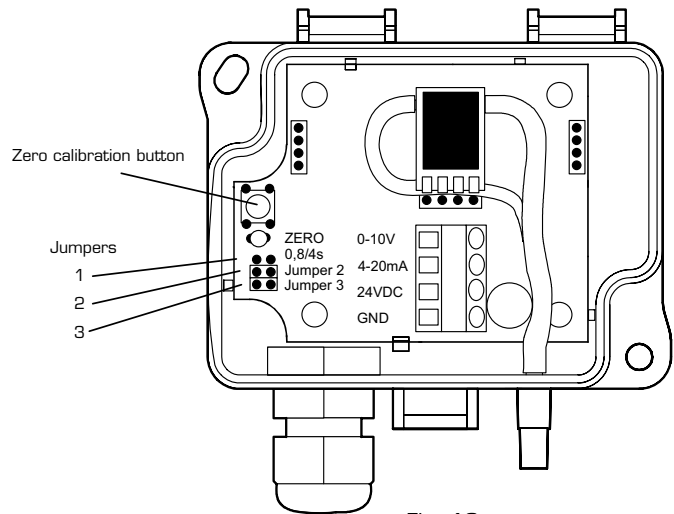


Fig. 16  
Zero point calibration

## k-factors

Flow determination according to the formula:

$$q = \frac{1}{k} \sqrt{\Delta p} \text{ m}^3/\text{s}$$

where the constant k is unique for each air handling unit size. The k factor is shown on the air handling unit data plate

## Temperature correction

The flow scale on the display instrument and flow formula above apply to air at a temperature of +20°C.

At other air temperatures the flow must be corrected using the formula:

$$q = q_{20} \sqrt{\frac{(273+t)}{293}} \text{ m}^3/\text{s}$$

q = the true flow through the fan,

q<sub>20</sub> = the flow reading

t = current temperature in °C



# Control equipment

## CO<sub>2</sub> sensor

Supply 24 VAC, output signal 0-10 VDC, measurement range CO<sub>2</sub> 0-2000 ppm

The CO<sub>2</sub>-sensor is supplied as a separate accessory. When installed in the duct position the sensor in the extract air duct as close to the air outlet as possible. When installed in a room position the sensor where the air quality is representative, for example, on an open wall at a height of 1.5–3 metres. Connect the CO<sub>2</sub>-sensor to the same input as the pressure sensor GP6; see the table for CO<sub>2</sub> compensation. If the mixing damper is CO<sub>2</sub> controlled connect the CO<sub>2</sub> sensor to the Z terminal block.

**NOTE!** These cannot be connected at the same time!

Terminal block in the CO <sub>2</sub> -sensor	Terminal block in the control panel (GP6/CO <sub>2</sub> )	Signal
G	G	24 VAC (phase)
M	GO	24 VAC (neutral)
U1	Y	Measurement signal
M	M	Measurement neutral

**NOTE!** To prevent a potential difference between the system neutral and measurement neutral, route separate wires to the appropriate sensors.

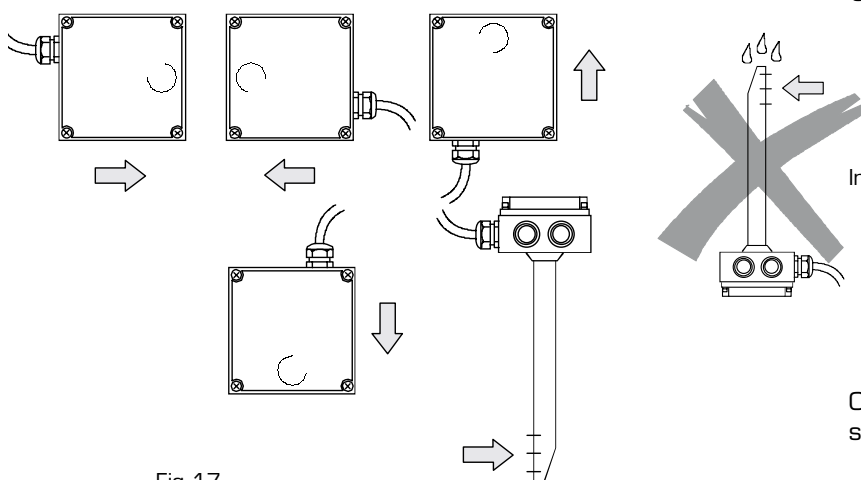
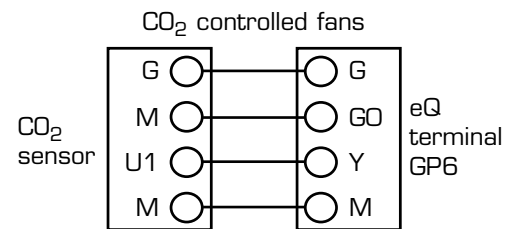


Fig. 17 Permitted mounting positions for the duct sensor



Impermissible mounting positions

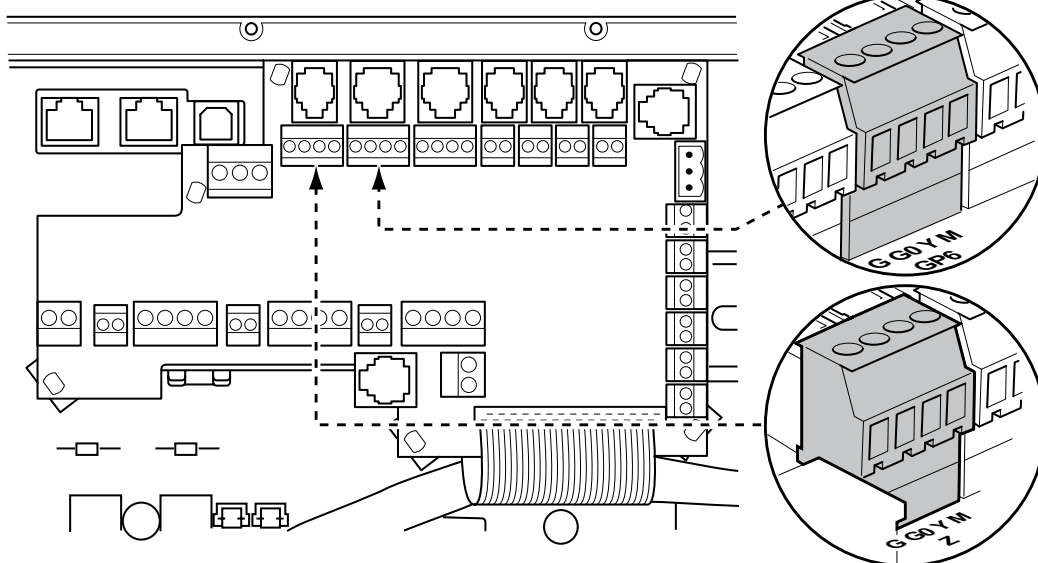
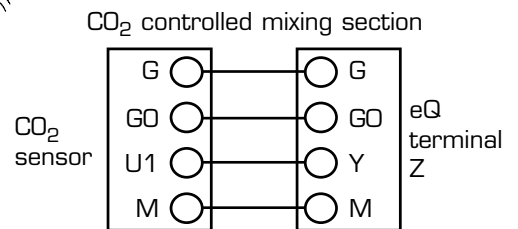


Fig. 18



# Control equipment

## Damper actuators

Are connected in the junction box for factory fitted dampers.

**NOTE!** If the air handling unit is configured for unoccupied heating mode via return air, the dampers must be positioned in the outdoor air and exhaust air connections.

Location	Quick-fit connector
Supply air	ST1-2
Extract/exhaust air	ST1-2

Damper actuator (24 VAC)	Torque	Terminal block	Connection Control panel	Function Damper actuator
Two-way with spring return	7Nm och 18 Nm	ST 1-2	G/(3) GO (2)	+ Controlled power supply, 24VAC - Supply neutral, GO
Two-way	8Nm, 16Nm och 24Nm	ST 1-2	G/(3) G (1) GO (2)	3 Controlled power supply, 24VAC 2 Power supply, G 1 Supply neutral, GO
Modulating	8Nm, 16Nm och 24Nm	ST 3 MIX, DMP	G GO Y M	2 Power supply, G 1 Supply neutral, GO 5 Controlled power supply, 0-10 VAC

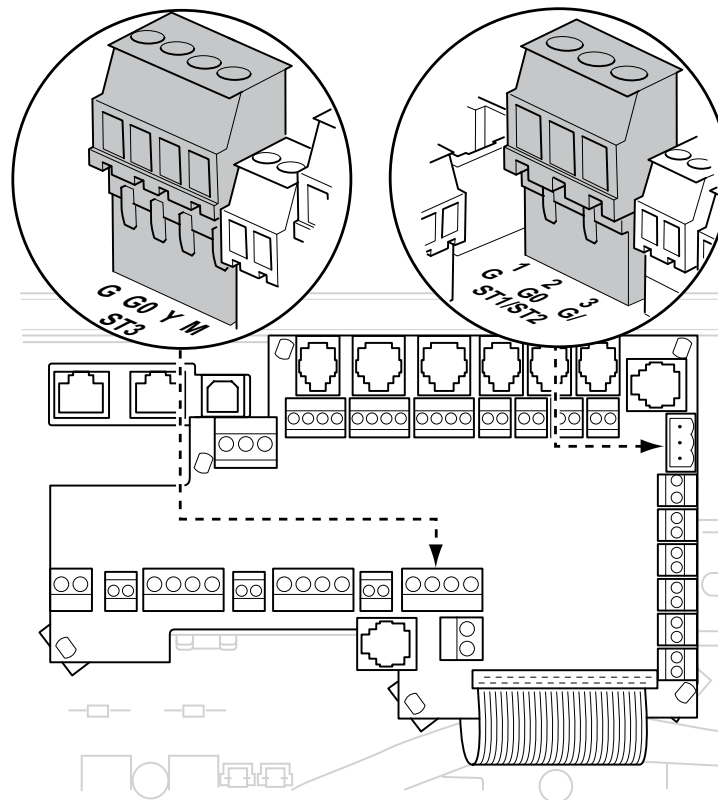
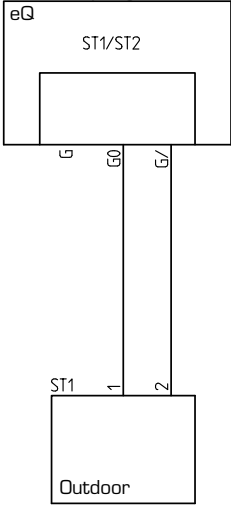


Fig. 19

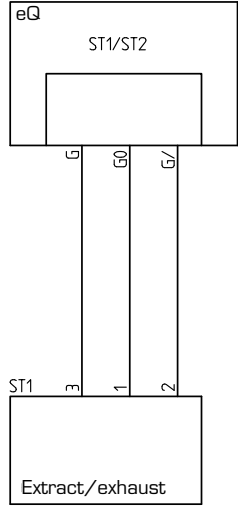


# Control equipment

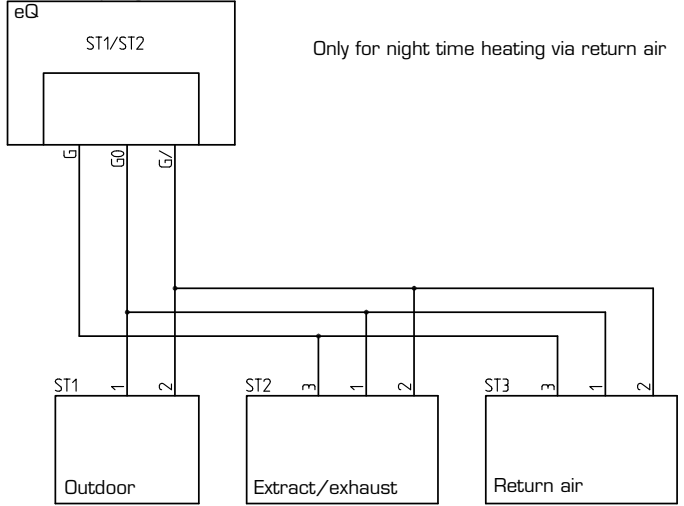
Only outdoor air actuator with spring return



Extract/exhaust air actuator on/off

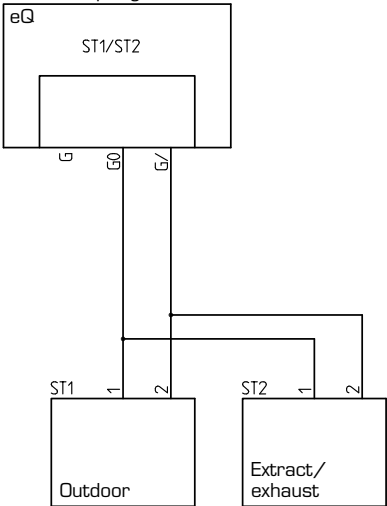


Outdoor/extract/exhaust/return air actuator spring return/on/off

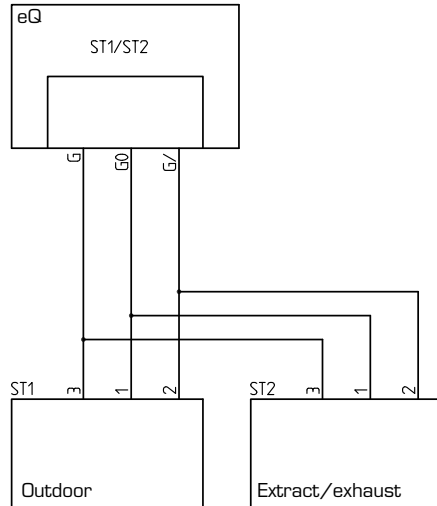


Only for night time heating via return air

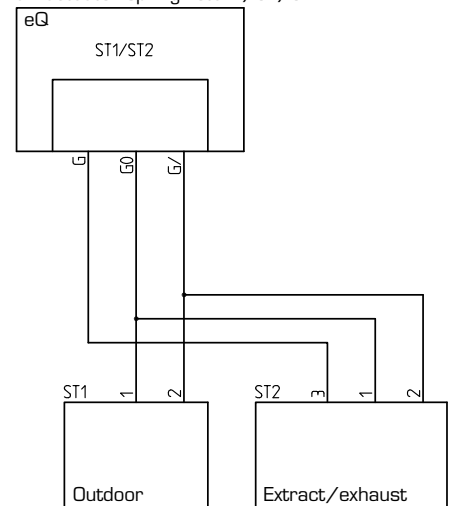
Outdoor/extract/exhaust air actuator with spring return



Outdoor/extract/exhaust air actuator on/off



Outdoor/extract/exhaust air actuator spring return/on/off



# Control equipment

## Filter monitors

Filter monitors GP1 and GP2 are supplied fitted with quick-fit connectors. The length of the pressure hoses should not exceed 5 metres. On delivery the contact function of the controller is set to NO. Set the required alarm limit across the filter using the knob on the sensor.

Filter monitor	Terminal block: Control panel	Junction box
Filter supply air	AUX1	GP1-2
Filter extract air	AUX1	GP1-2
Prefilter supply air	AUX1	GP1-2
Prefilter extract air	AUX1	GP1-2

Hose connection: inner diameter 4 mm.

## Fan monitors

Fan monitors GP3 and GP4 are supplied fitted with quick-fit connectors. The length of the pressure hoses should not exceed 5 metres. On delivery the contact function of the controller is set to NO. Set the required alarm limit across the filter using the knob on the sensor.

Fan monitor	Terminal block: Control panel	Junction box
Supply air	AUX2	GP3-4
Extract air	AUX2	GP3-4

Hose connection: inner diameter 4 mm.

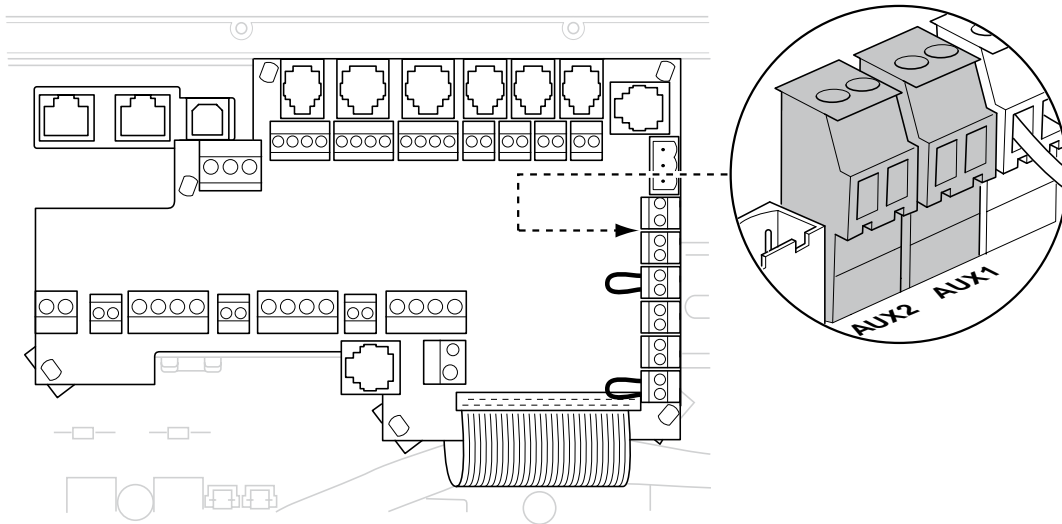


Fig. 20



# Control equipment

Timer, push button, motion sensor and CO<sub>2</sub> monitor

The timer, push button, motion sensor and CO<sub>2</sub> monitor are supplied with the unit but not installed. Set the desired function in Operational Function.

Type of operation	Terminal block
Extended operation, low speed	SU1
Forced operation, high speed	SU2

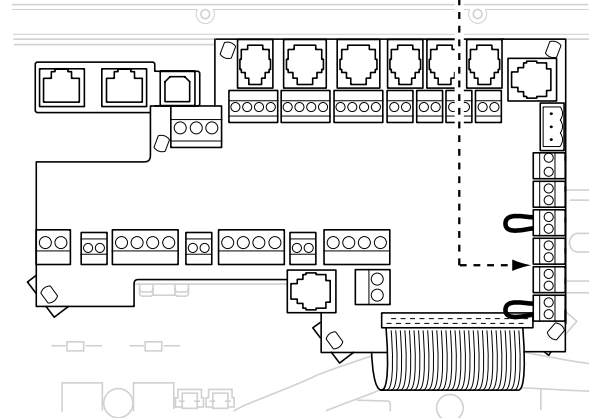
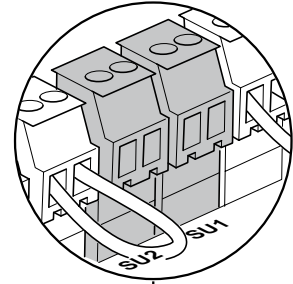


Fig. 21

## External Timer

For operating control. Five set operating periods can be selected. When necessary the maximum limitation of operation can be achieved using jumpers in the required position: 1, 2 or 3 hours. The operating period selected cannot be longer than the time corresponding to the position of the jumper. A frame for surface mounting is supplied with the unit.

**NOTE!** When using an external timer do not forget to set the internal timer in the control system to 0.

MAIN INDEX → UNIT → OPERATING MODE  
EXTERNAL CONTROL → DELAY SETTING

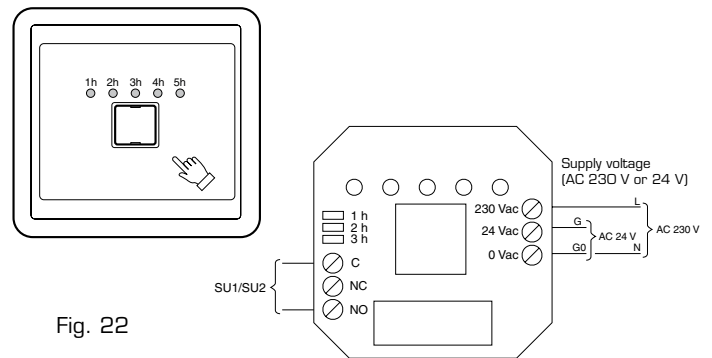


Fig. 22

## Push button

Set extended/forced operation in the handheld terminal. The supplied frame is used for surface mounting. Set the required operating period in the parameters below.

MAIN INDEX → UNIT → OPERATING MODE  
EXTERNAL CONTROL → DELAY SETTING

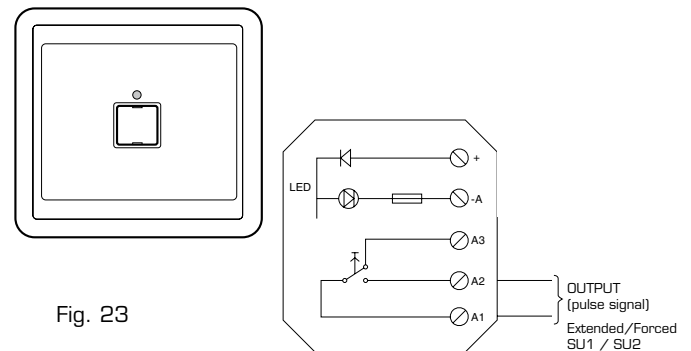


Fig. 23





# Control equipment

## CO<sub>2</sub> monitor

For extended/forced operation. Supplied with the unit but not installed. Set the time on the controller to 0.

MAIN INDEX → OPERATING MODE  
EXTERNAL CONTROL → DELAY SETTING

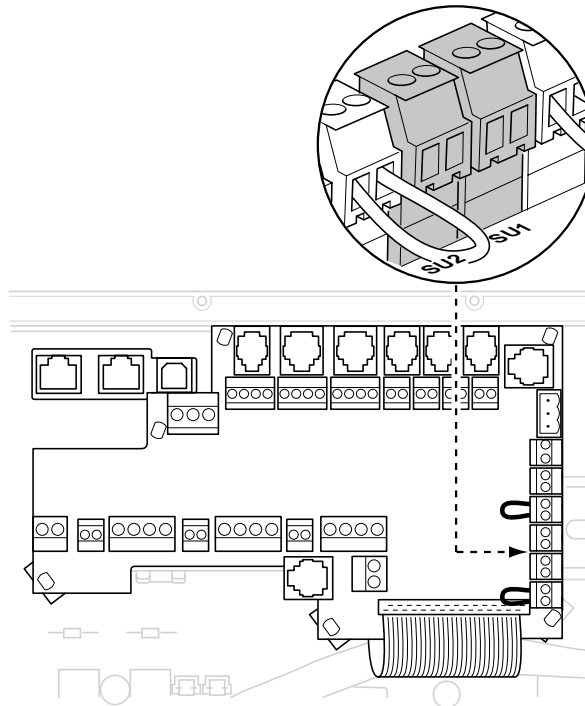
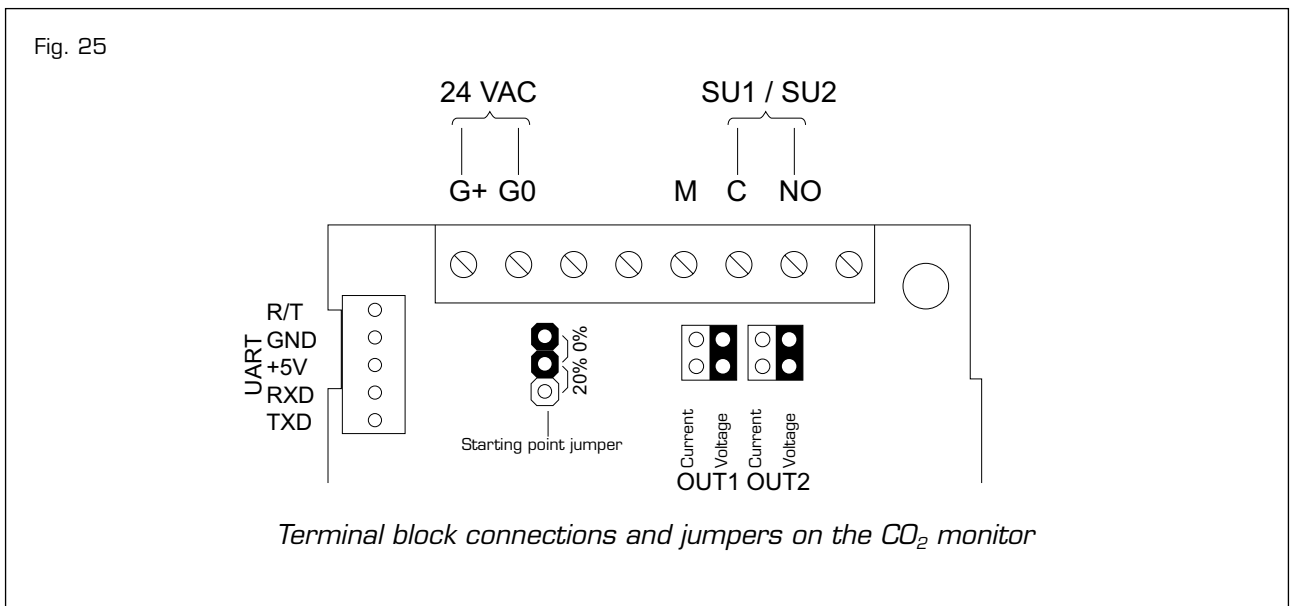


Fig. 24



# Control equipment

## Motion detector

Mounting height 1.6–2 m.

Set the desired time up to 60 minutes for “air handling unit in operation in the event of occupancy” in the motion detector.

For longer operating periods use the delay setting parameter in the control unit.

MAIN INDEX → UNIT → OPERATIONAL FUNCTION  
EXTERNAL CONTROL → DELAY SETTING

SU 1/SU 2

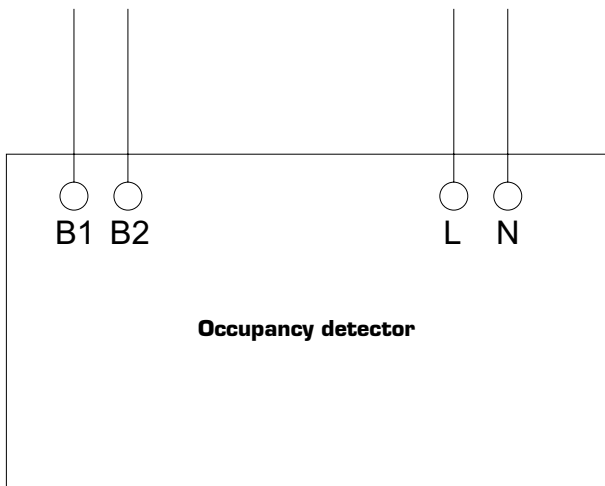


Fig. 26  
Connect SU1/SU2 on B1 and B2.  
Connect power supply 230 VAC on L and N.

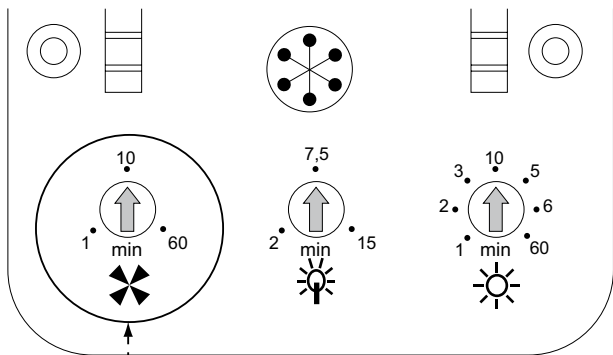


Fig. 27  
Set the delay setting (10/60 min.) using the potentiometer on the far left in accordance with Figure 27.

Detection range

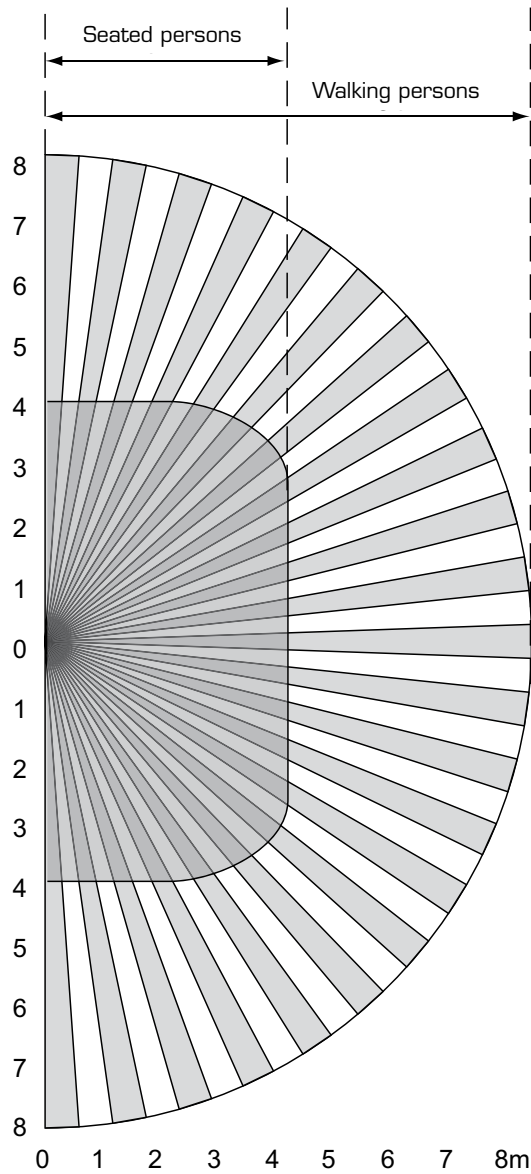
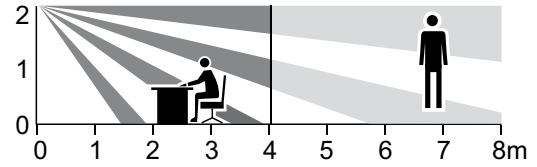


Fig. 28  
The figure shows the detection range from the side and from above. The range is different for people who are sitting and people who are walking.

## Control equipment

### Heating coil

Connect the circulation pump, freeze protection sensor and valve actuator for hot water in accordance with the table. If the pump motor does not have an integrated alarm unit, the motor protection can be used to receive

an alarm signal. Connect a 3-phase pump directly to the contactor. Connect a 1-phase pump via a quick-fit connector to the junction box or via a terminal block on the control panel.

Component	Terminal block	Comment	
Circulation pump CP1 (1-phase) L	Heating (NO)	Heating (L) - Heating (C) jumper	
	N		Heating (N)
	PE		PE
Circulation pump CP1 (3-phase) U	L1	See Fig. 29	
	V		L2
	W		L3
	PE		PE
Alarm	n/a*	Alarm CP1/GT7	Potential free alarm input, supplied design NO
	n/a*		
Frost protection sensor	n/a*	GT5	PT1000
	n/a*		
Valve actuator	G	Heating actuator (G)	
	GO	Heating actuator (GO)	
	Y	Heating actuator (Y)	
	M	Heating actuator (M)	

\*) The wires are interchangeable

### Cooling coil

Connect the circulation pump and valve actuator for chilled water according to the table. If the pump motor does not have an integrated alarm unit, the motor protection can be used to receive an alarm signal. Connect a 3-phase pump directly to the contactor. Connect a 1-phase pump via a quick-fit connector

to the junction box or via a terminal block on the control panel. When connecting pump control in the junction box, strap the junction box to achieve the correct pump function, see page 16 pos. 11.

Component	Terminal block	Comment	
Circulation pump CP1 (1-phase) L	Cooling (NO)	Heating (L) - Heating (C) jumper	
	N		Cooling (N)
	PE		PE
Circulation pump CP1 (3-phase) U	L1	See Fig. 29	
	V		L2
	W		L3
	PE		PE
Alarm	n/a*	Alarm CP1/DX	Potential free alarm input, supplied design NO
	n/a*		

\*) The wires are interchangeable

# Control equipment

## Heat exchanger

Circulation pump/start signal for heat exchanger is connected according to table.

Component	Terminal block	Comment	
Circulation pump CP1 (1-phase) N	Start VVX (NO)	Potential free connection function	
	L	Start VVX (C)	Potential free connection function
	PE	PE	
Circulation pump CP1 (3-phase) U	L1	See Fig. 29	
	V		
	W		
	PE		
Alarm	n/a*	Alarm CP2/DX	Potential free alarm input, supplied design NO
	n/a*		

\*) The wires are interchangeable

Fig. 29 a 1. Hot water, 2. Chilled water

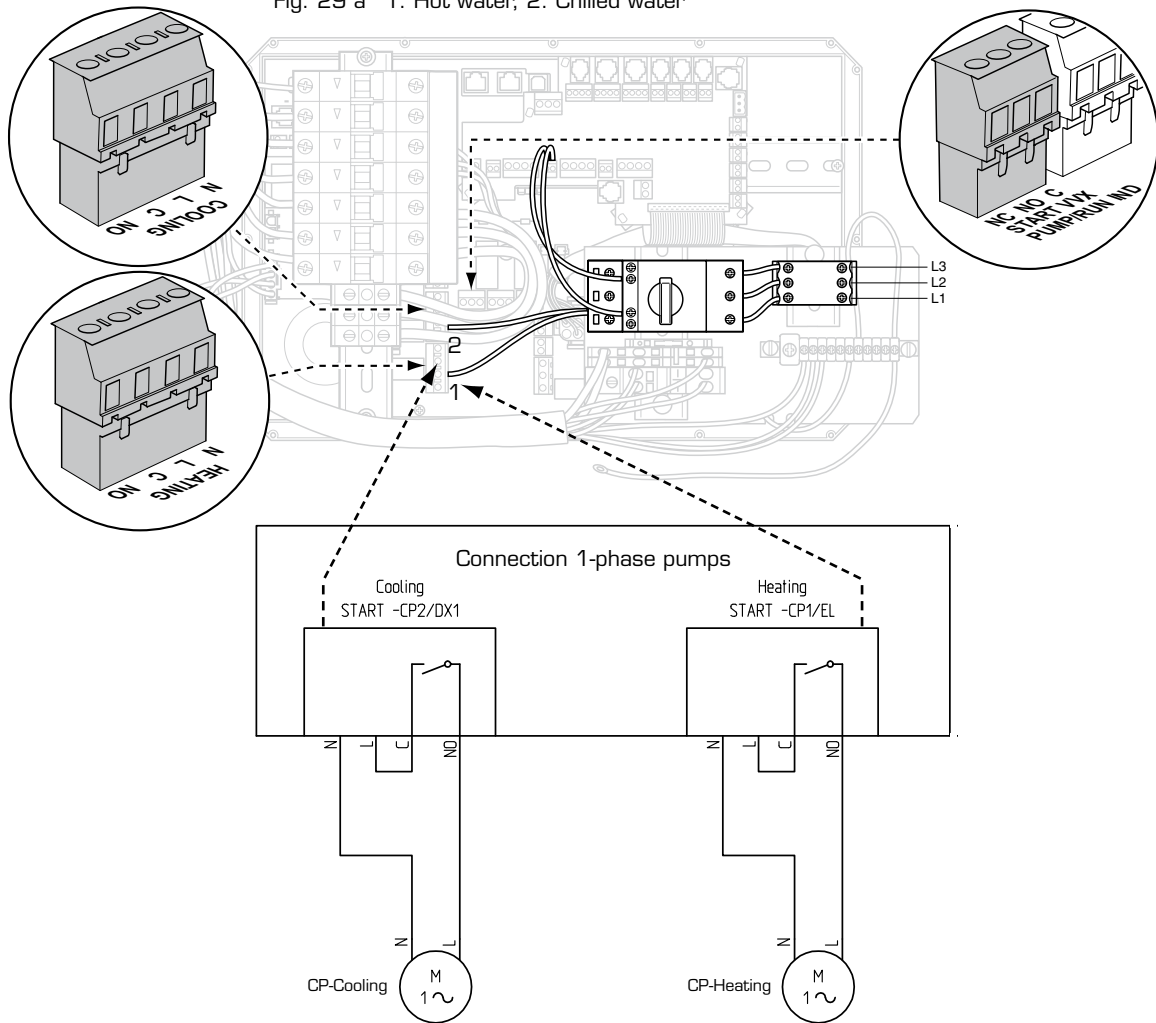
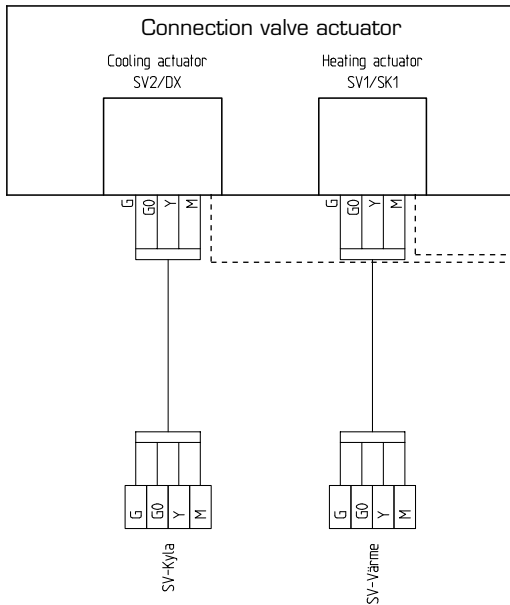
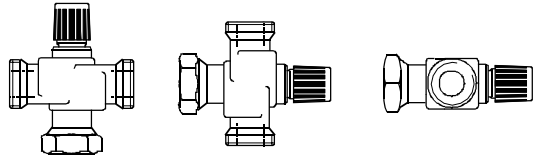


Fig. 29 b



# Control equipment

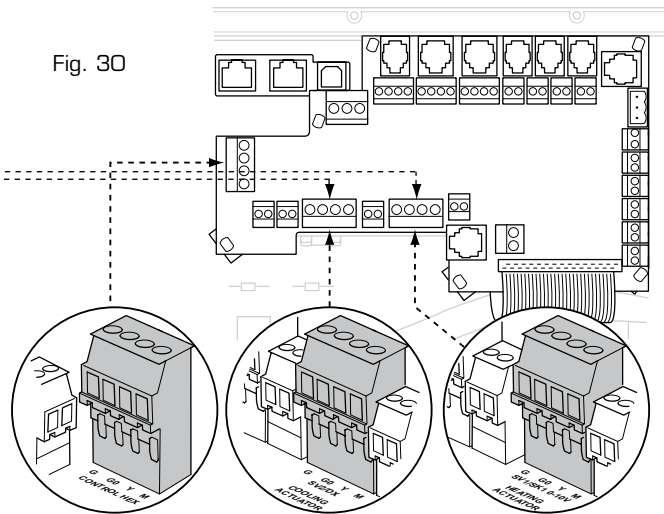
## Permissible mounting methods



Terminal block: Valve actuator	Terminal block: Control panel	Signal
G	G	24 VAC (phase)
GO	GO	24 VAC (neutral)
Y	Y	Control signal
GO	M	Signal neutral

Applies to terminal blocks Cooling actuator, Heating actuator and Control HEX.

Fig. 30



## Frost protection sensor

**Clamp on sensor:** Ensure that the sensor element is in contact with the pipe. Mount on the return pipe. Find a representative location, scrape off any paint, apply paste and position the sensor. Secure it well with the tensioning strap provided.

**Immersion sensor:** Install on the pipe first in the air flow direction. (Air drain pipe).

If the heating coil is located so far from the control cabinet that the cable does not reach, cut the connector and splice the cable. Then connect it to screw terminal block GT5. The wires are interchangeable.

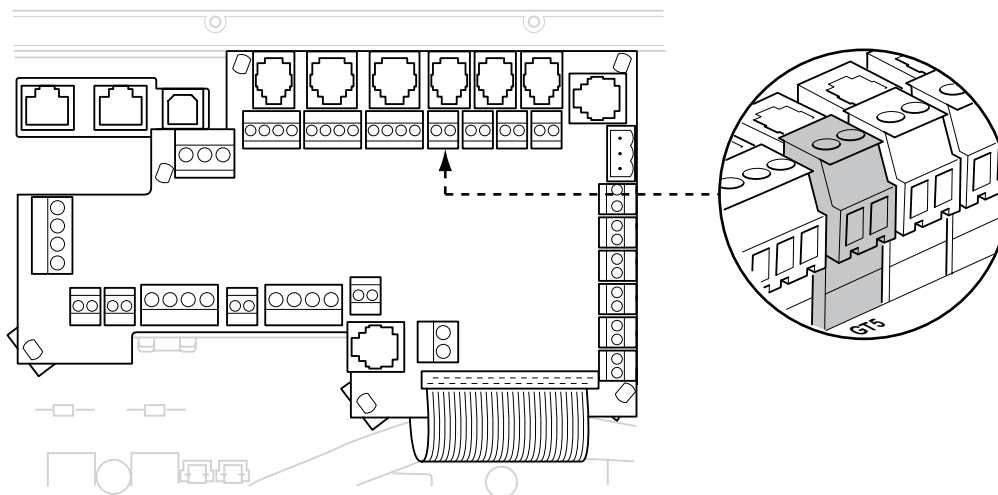


Fig. 31



# Control equipment

## Electric heater

When the electric air heater is supplied by Fläkt Woods AB it is equipped with cables fitted with quick-fit connectors to the control panel/junction box.

**NOTE!**

The electric air heater is supplied with power separately. See the figure below.

If the electric air heater has been ordered from another supplier, connect it to a terminal block, see page 29, Fig. 34.

If the electric air heater is intended for in duct installation, connect it to the control panel via a terminal block.

Connection diagram with quick-fit connectors

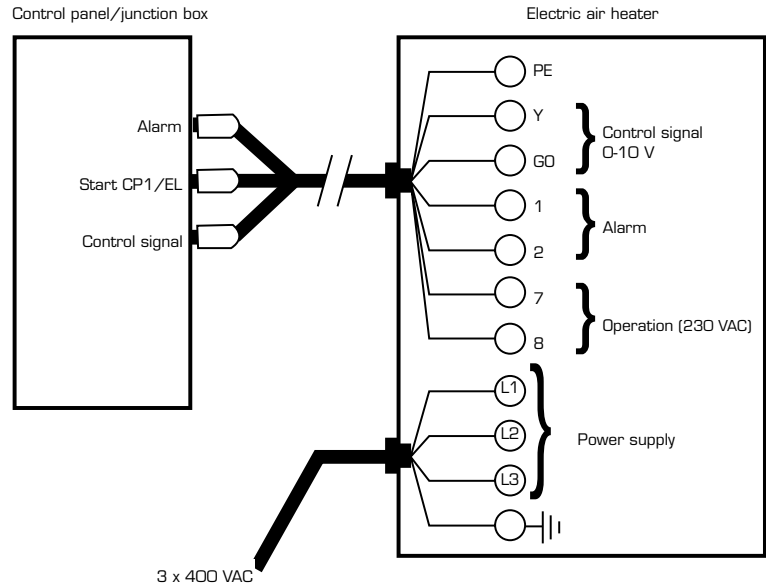


Fig. 32  
Connection diagram with quick-fit connector

## Connecting duct-mounted electric air heater with potential free operation

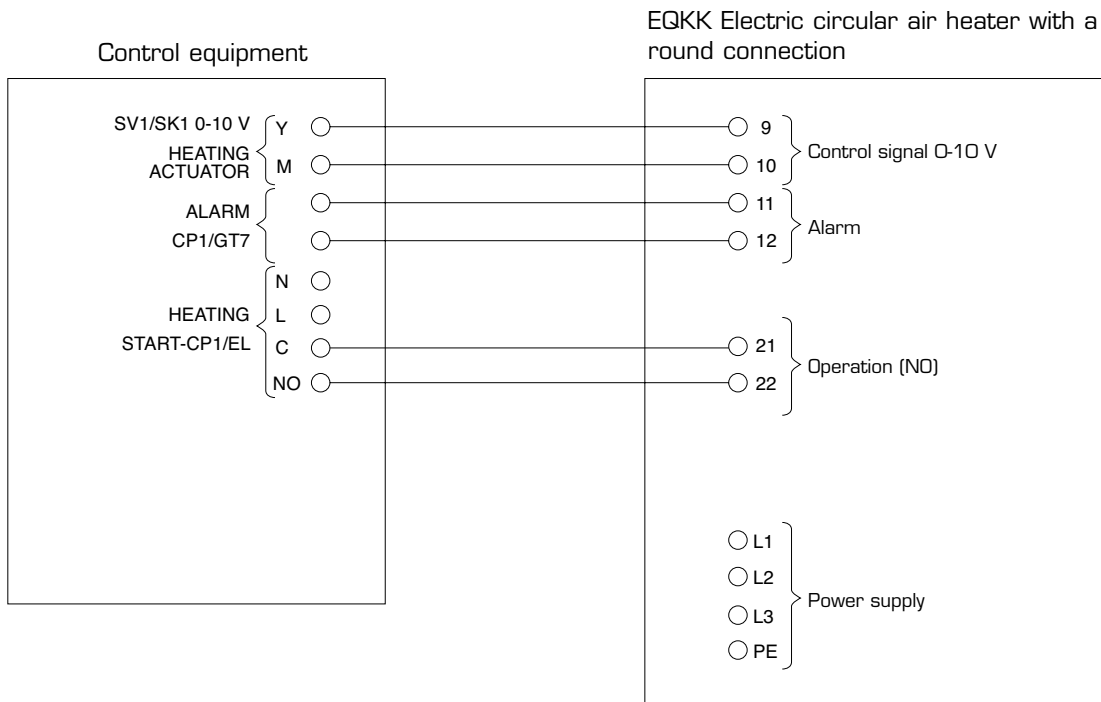


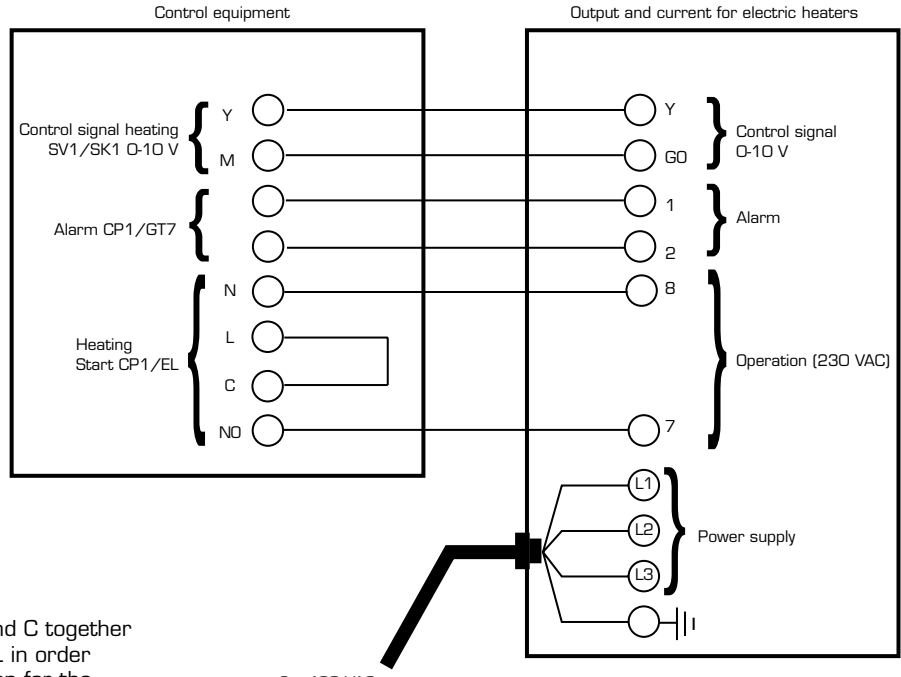
Fig. 33  
EQKK circular air heater with a round connection



# Control equipment

Connection diagram without quick-fit connector (duct-mounted electric air heater)

**NOTE!**  
The electric air heater is supplied with power separately.



**NOTE!** Connect terminal blocks L and C together in terminal block group Start CP1/EL in order to obtain the 230 VAC control function for the electric air heater start signal.

3 x 400 VAC Fig. 34  
Connection diagram without quick-fit connector

## Connecting duct-mounted electric air heater with 230 VAC operation

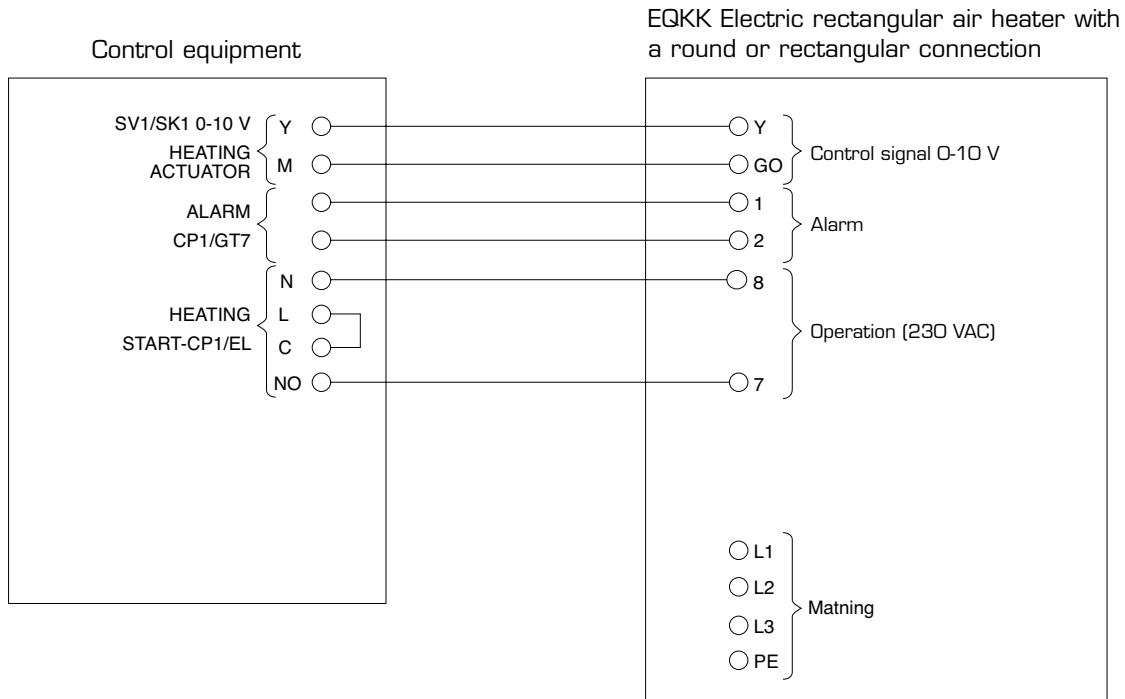


Fig. 35  
EQKK Electric rectangular air heater with a round or rectangular connection

## Control equipment

Output and current for electric heaters

Output EGEK/EQKK kW	Max. power consumption A 3x230 V	Max. power consumption A 3x400 V
3	7,5	4,3
5	12,6	7,2
6	15,1	8,7
7	18,8	10,8
9	25,1	14,4
12	30,2	17,4
13	32,6	18,8
15	37,7	21,7
17	42,7	24,5
20	50,2	28,9
24	60,2	34,6
27	67,8	39,0
30	75,3	43,3
34	85,3	49,1
37	92,9	53,4
43	107,9	62,1
47,5	119,2	68,6
54	135,6	77,9
59	148,1	85,2
65	163,2	93,8
69	173,2	99,6
75	188,3	108,3
81	203,3	116,9
90	225,9	129,9
108	271,1	155,9
120	301,2	173,2
150	376,5	216,5
180	451,9	259,8
230	577,4	332,0
280	702,9	404,2



## Control equipment

Minimum permissible air flows for duct-mounted electric air heater, EQKK

Connection Ø/(BxH)	Output variants, kW			Minimum flow m <sup>3</sup> /s
	Variant 1	Variant 2	Variant 3	
Ø315	3	5	9	0,12
Ø400 <sup>1</sup>	5	9	15	0,19 (0,24 <sup>1</sup> )
Ø500 <sup>2</sup>	12	17	24	0,37
800x400	12	17	24	0,48
1100x500	17	30	43	0,82
1400x600	20	34	54	1,3
1400x800	30	48	75	1,7

1 Rectangular air heater (400x400) with a circular connection for output variant 3 (15kW)

2 Rectangular air heater (500x500) with circular connection, all output variants

Minimum flows for air handling unit-mounted electric air heater, EQEK

Air handling unit size	Minimum flow m <sup>3</sup> /s
aaa	
005	0,27
008	0,50
009	0,55
011	0,7
014	0,8
018	1,1
020	1,2
023	1,6
027	1,6
032	1,9
036	2,1
041	2,4
045	2,6
047	2,8
050	3,2
054	3,2
056	3,3
063	3,7
068	3,9
072	4,2
079	4,6
090	5,3

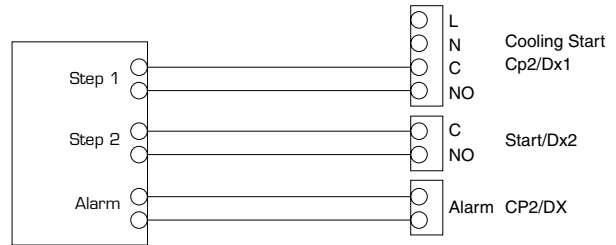


# Control equipment

## DX cooling

The control signal can be wired to the eQ in various ways depending on how many capacity steps the DX coil has. The build-in controller can manage 1-step, 2-step and binary DX cooling (3-step).

Function	Configuration
1-step Dx cooling	Start 20% Stop 10%
2-step Dx cooling	Start 40% Stop 30%
3-step Dx cooling	Start 80% Stop 70%
Alarm	NO



## Z sensor

The air handling unit is equipped with a Z input that can be used as a temperature sensor input for calculating heat exchanger efficiency, as an input for a pressure monitor across the heat exchanger or as an input for an external setpoint. Connect the signal to the Z input as set out in the table, or using a quick-fit connector.

The desired function must then be activated in the controller. Access rights are required by logging in.

MAIN INDEX → CONFIGURATION

In order for the new function to take effect the configuration must be saved and the unit restarted.

If the Z input is to be used for the heat exchanger pressure monitor, set the minimum speed for the heat exchanger under:

MAIN INDEX → UNIT → TEMP CONTROL  
→ HEAT RECOVERY

If the Z input is to be used for an external setpoint, set the setpoint values for 0 - 10 V or Ohms under:

MAIN INDEX → UNIT → INPUTS → OTHER

**NOTE!** Prior to physically connecting control accessories not supplied with the unit they must be configured in the controller.

Some examples for using Z sensors:

Terminal block	Signal	Component
Z (G)	24 VAC (phase)	Power supply
Z (GO)	24 VAC (neutral)	Power supply
Z (M)	Measurement signal (neutral)	Setpoint offset, temperature sensor, heat exchanger, pressure controller
Z (Y)	Measurement signal (Ω, 0-10 VDC)	Setpoint offset, temperature sensor, heat exchanger pressure controller

**NOTE!** Activating the external setpoint function overrides the setpoints in the controller.



# Control equipment

## ECONET®

Connect Econet® via Modbus RTU. There are connections in the control panel and junction box. See the Econet® documentation for further information.

D sub pin on ECONET®	Terminal block, control panel	Function
3/2	Modbus +	RxD+/TxD+
5	Modbus ref	GND
8/7	Modbus -	RxD-/TxD-

Configuration in the controller is carried out under:

MAIN INDEX → CONFIGURATION → CONFIGURATION 1

**NOTE!** Check the jumper for communication in the control panel when connecting via the junction box, see page 36.

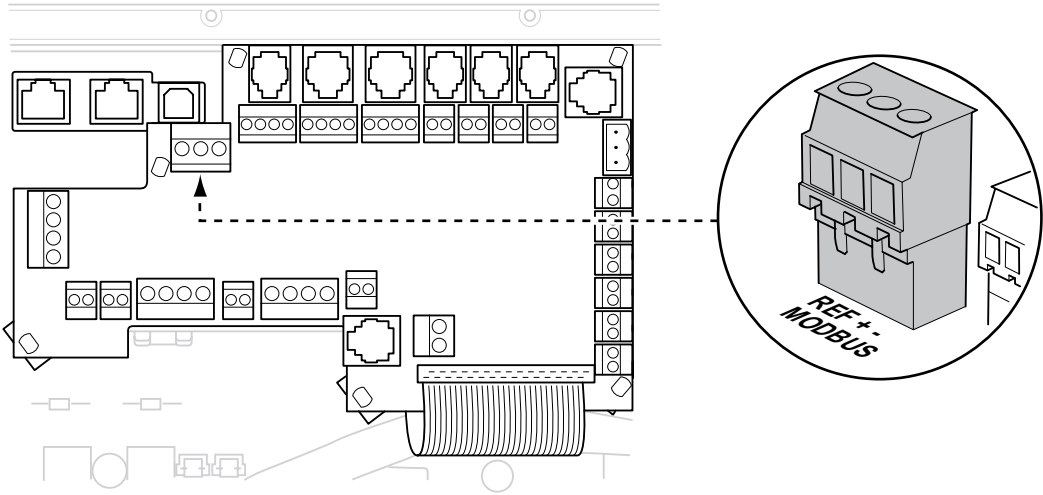


Fig. 36



# Control equipment

## Preheater

The preheater connection unit is located in the external control cabinet and is then connected by bus communication to the control panel or a junction box.

Terminal block, preheater	Function
201	A +
202	B -

**NOTE!** Check the jumper for communication in the control panel when connecting via the junction box.

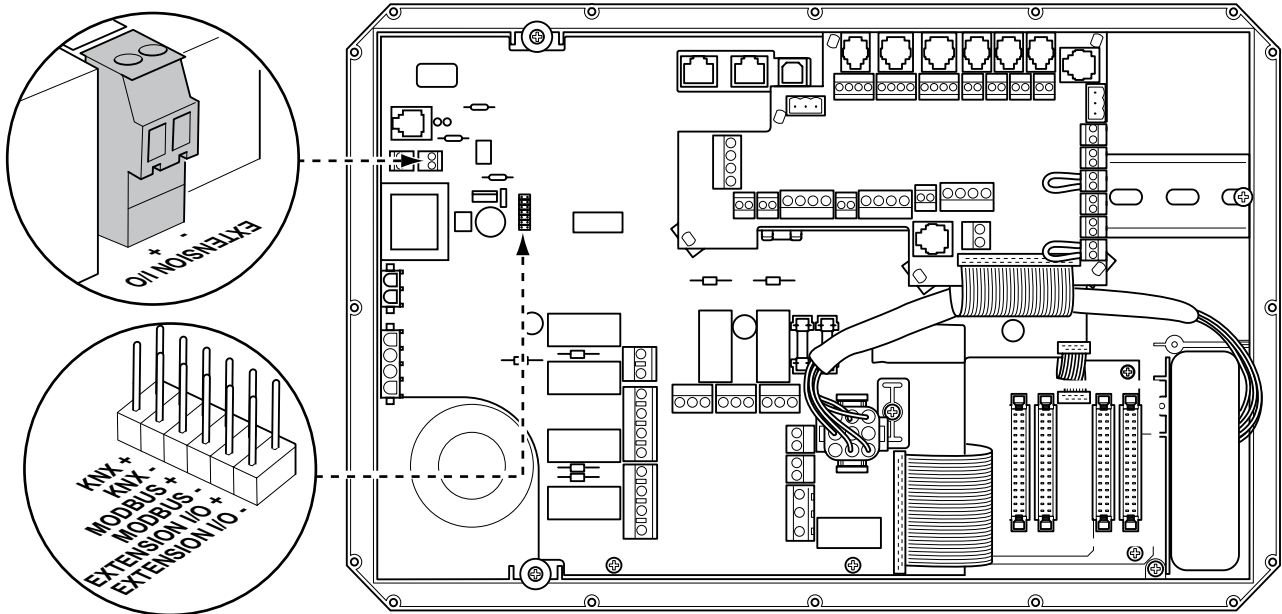


Fig. 37

Connecting to a preheater in an external control panel:

Component	Terminal block, Fost coil	Comment
Heating actuator	Y – M	Control signal to the valve actuator or electric air heater. 0-10V
	G – GO	Power supply: 24 VAC*
Heating	NO – C	Operation of the circ. pump/electric air heater. (Potential free)
	L – N	Power supply: 230VAC, max. 3 A
Pump group (3-fas)	L1-L2-L3	Power supply for 3-phase pump from contactor.
	CP1/GT7	Alarm from the circulation pump or thermal overload protection in the electric air heater. NO (changeable)
Frost protection sensor	GT5	For heating coils.Type PT1000

\* **NOTE!** Separate wires should be routed for these to avoid potential difference between the supply neutral and the measurement/control neutral. See pages 28-29 for instructions related to connecting an electric preheater.

Configuration in the controller is carried out under:

MAIN INDEX → CONFIGURATION → CONFIGURATION 1

To obtain the correct bus communication in the junction box, see page 16 (pos. 7), the correct strapping is required in the control panel. In the event of problems check that the strapping under the power unit in the control panel is on Extension IO.



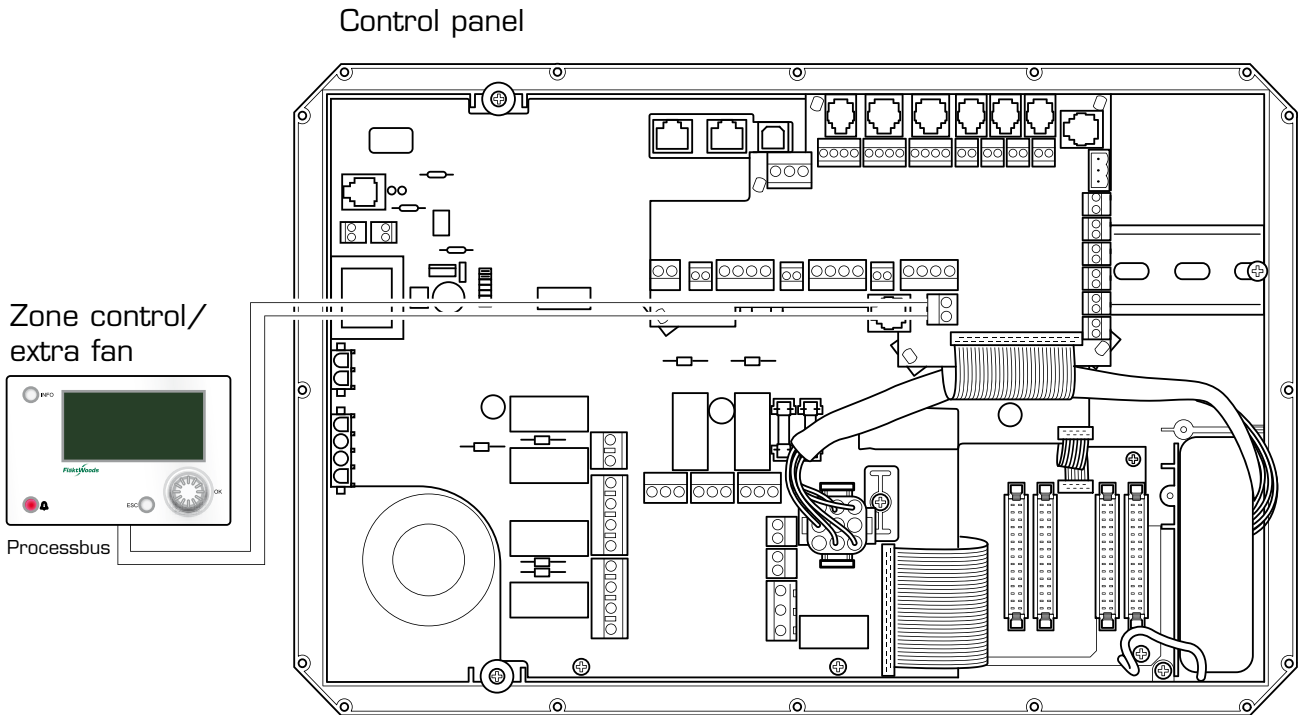
# Control equipment

## Temperature zones and external fans

To install temperature zones and extra fans use an extra controller, mounted close to the heater/cooler/fans or accessories specific to the zone. Connect zone control/extra fans to the main controller via Processbus, see the figure below.

For the installation of functions and sensors to zone control, see the separate documentation.

\* **NOTE!** Check the jumper for communication in the control panel when connecting via the junction box, see page 35, Fig. 37.



Terminal block, control panel	Terminal block, zone, external fan	Terminal block, handheld terminal
KNX+	502	CE +
KNX-	501	CE -

When connecting the handheld terminal (HMI) with the control panel and temperature zones/external fans via KNX. Enables several DUC:s to one handheld terminal.

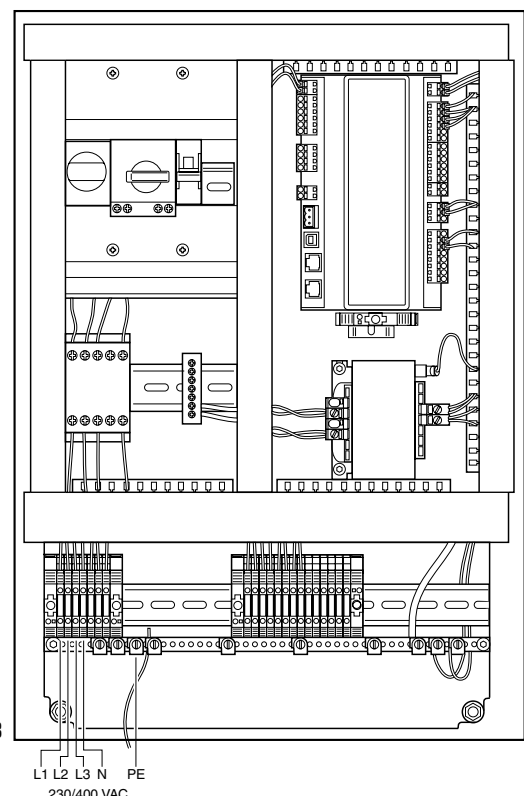


Fig. 38



# Control equipment

## Fire protection unit and/or external stop

Connect the fire protection unit and auxiliary equipment to stop the unit according to the table below. Access the following parameter to change the contact function for the smoke/fire alarm.

MAIN INDEX → UNIT → INPUTS  
→ DIGITAL ALARMS → FIRE ALARM

Access the following parameter to change the contact function for the external stop.

MAIN INDEX → UNIT → INPUTS  
→ DIGITAL INPUTS

Component	Terminal block	Comment
External smoke/fire alarm	Fire	Potential free input, supplied design NC, configurable
External stop (for example when exercising fire dampers)	Stop	Potential free input, supplied design NC, configurable
Power supply for the fire protection unit	L1 - N	230 VAC, Max. 2A

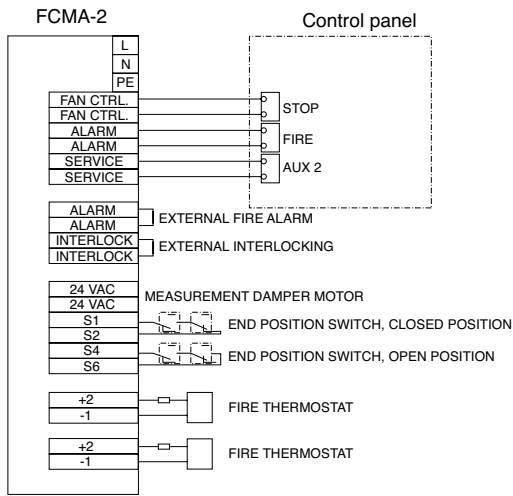


Fig. 39

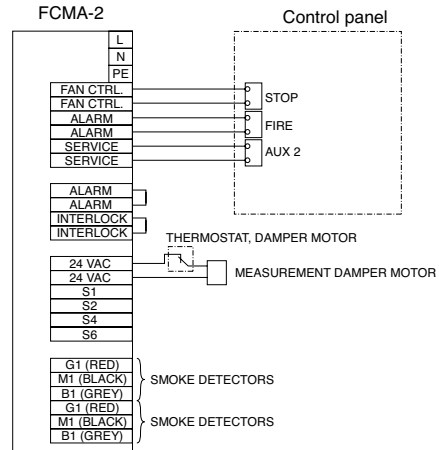


Fig. 40

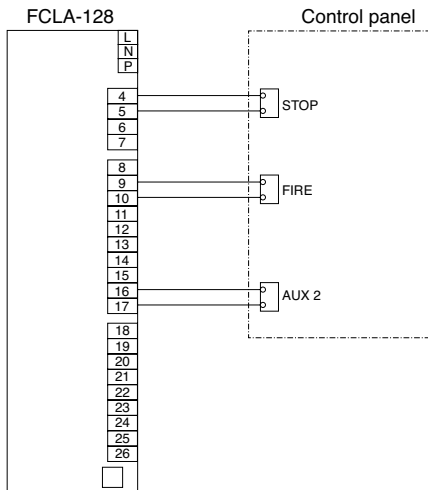


Fig. 41

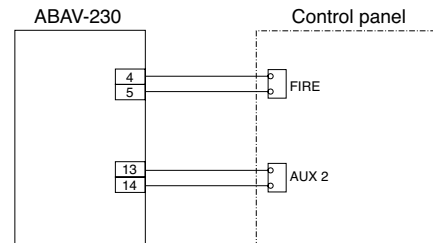


Fig. 42

## Control equipment

### Operation of fans in the event of fire

It is possible to set the function of fans when there is a fire alarm in the air handling unit.

<p style="text-align: center;">MAIN INDEX → UNIT FIRE PROTECTION → FUNCTION</p>
---

#### Selection

Stop	Both fans stopped.
Operation SAF [supply air fan]	Only the supply air fans in operation. Fire setpoint.
Operation EAF [extract air fan]	Only the extract air fan in operation. Fire setpoint.
Operation	Both fans in operation using the fire setpoint.

#### Parameter Comment

Setpoint, Fire	0 -100%. Setting the fan control signal in the event of a fire alarm.
----------------	---

## Control equipment

Connecting external components in the control panel

Function	Terminal block	Connection	Comment
Cooling	Cooling actuator	Y – M	Control signal to the valve actuator 0-10 V
		G – GO	Power supply: 24 VAC*
	Cooling	NO – C	Operation of the circ. pump/DX cooling step 1 (Potential free)
	Start	L - N	Power supply: 230VAC, max. 2 A
	Start DX-2	NO - C	DX cooling step 2 (Potential free max. 2 A)
	Alarm CP2/DX		Alarm from circulation pump or DX cooling NO (changeable)
<b>3-phase pump</b>	(Pump group)	L1-L2-L3	Power supply for 3-phase pump from contactor.
Heating	Heating actuator	Y – M	Control signal to the valve actuator and electric heater. 0-10V
		G – GO	Power supply: 24 VAC*
	Heating	NO – C	Operation of the circ. pump/electric heater. (Potential free)
		L – N	Power supply: 230VAC, max 2 A
	Alarm CP1/GT7		Alarm from the circ. pump or thermal overload protection in the electric heater. NC (changeable)
<b>3-phase pump</b>	(Pump group)	L1-L2-L3	Power supply for 3-phase pump from contactor.
Heat exchanger	Control HEX	Y-M	Control signal to heat exchanger 0-10 V
		G-GO	Power supply 24 VAC*
	Alarm HEX		Alarm from heat exchanger
	START WX	NC - NO - C	Operation of heat exchanger circ. pump
Frost prot. sensor	GT5		Type PT1000
Supply air sensor	GT1		Type PT1000. To be mount.at least 1500 mm from poss. duct air heater
Room sensor	GT2		Type PT1000
Extract air sensor	GT12		Type PT1000
Z input	Z	Y – M	Factory fitted option GT10:/GT11 (Type PT1000), Setpoint offset: (0 - 10 V or Ohm), heat exchanger pressure monitor (NO)
		G – GO	Power supply: 24 VAC*
Outdoor air sensor	GT3		Factory fitted option or facade sensor type PT1000
Supply air pressure sensor	GP5	Y – M	Measurement signal: 0-10V
		G – GO	Power supply: 24 VAC*
Pressure sensor		Y – M	Measurement signal: 0-10V 0-10V
extract air, CO <sub>2</sub> sensor		G – GO	Power supply: 24 VAC*
Fire alarm	Fire		Supplied as NC, but this can be changed on the display.
External stop	Stop		For example, fire damper exercising. NC (changeable)
Timer	SU1		Low speed NO
		SU2	High speed NO
AUX input	Aux1		Filter alarm. NO. Common supply air and extract air
	Aux2		Flow alarm. NO. Flow monitors NC.
Alarm output	A-alarm	NO – C – NC	Potential free, max. 2 A
	B-alarm	NO – C – NC	Potential free, max. 2 A
Bus	Modbus RTU	Ref + –	Connection, Bus communication for Modbus RTU
	Extension I/O	+, –	Connecting external IO expansion module
	KNX	KNX+, KNX–	Connection to processbus (Zone control and extra fans)
Damper actuators	ST3	Y – M	Mixing damper control signal
	MIX, DMP	G – GO	
Power supply	24VAC	~ – OV	External component power supply 24 VAC
	24VDC	+, –	External component power supply 24 VDC
Lighting control	Light Control	L – N – PE	Input for external lighting control (not power supply)
Preheater	Extension I/O	+, –	Connecting bus communication to preheater

\* **NOTE!** Separate wires should be routed for these to avoid potential difference between the supply neutral and the measurement/control neutral.



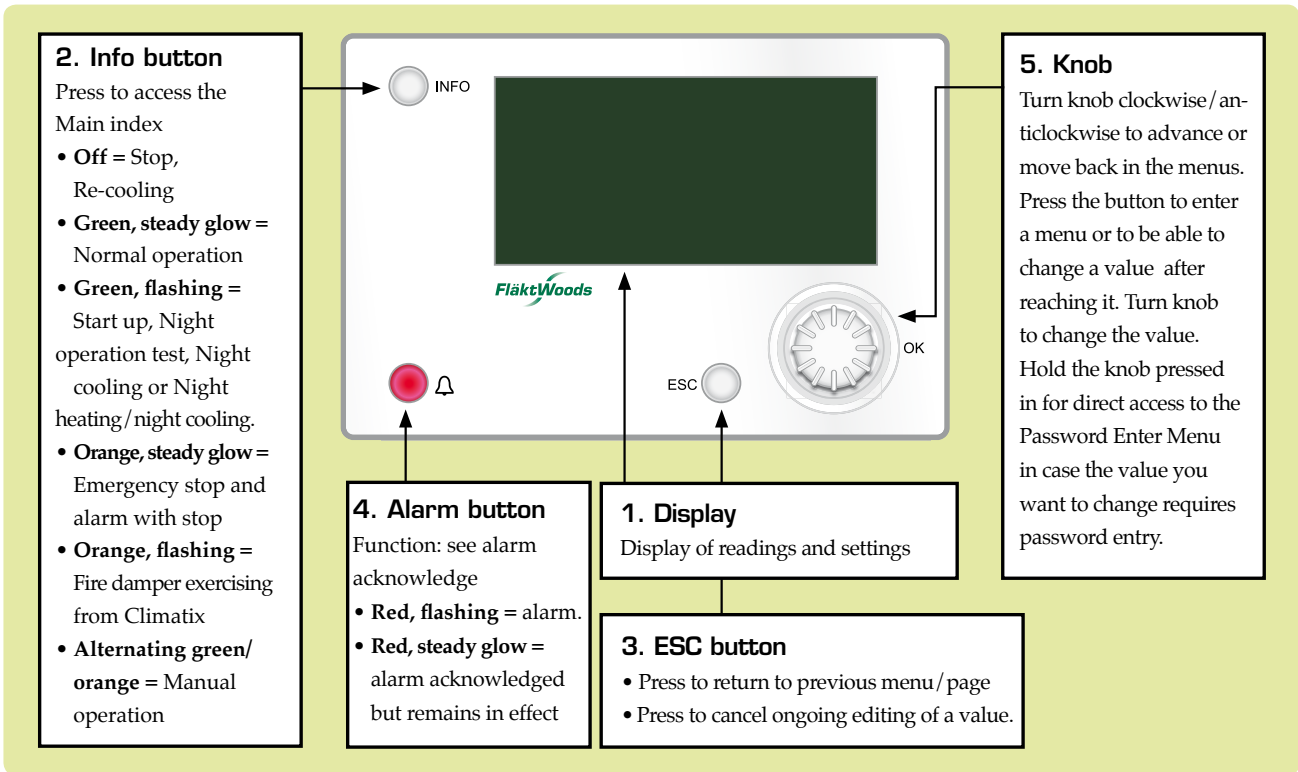
## Control equipment

Connecting components in the junction box

Function	Terminal block	Connection	Comment
Supply air sensor	GT1	Quick-fit connector	Type PT1000
Outdoor temp. sensor	GT3	Quick-fit connector	Type PT1000
Z input	GT4	Quick-fit connector	Type PT1000
Frost protection sensor	GT5	Quick-fit connector	Type PT1000
Extract air sensor	GT12	Quick-fit connector	Type PT1000
Filter monitor (supply/extract air)	GP1-2	Quick-fit connector	NO
Fan monitor (supply/extract air)	GP3-4	Quick-fit connector	NC
Pressure monitor - heat exchanger defrost	GP7	Quick-fit connector	NO
Heating	Heating	Quick-fit connector	Heating control signal
Cooling	Cooling	Quick-fit connector	Cooling control signal
Recovery	Recovery	Quick-fit connector	Heat exchanger control signal
Mixing damper	Mixing	Quick-fit connector	Mixing damper control signal
Damper actuators	ST1 – 2	Quick-fit connector	Control signal, damper actuator, 24 VAC
Pressure/flow sensor	GP5-6/GF1-2	Quick-fit connector	Measurement signal and power supply
Flow sensor/fan alarm	GF1-2/L.TF/FF	Quick-fit connector	Measurement signal and power supply
BUS-communication	Modbus	Quick-fit connector	Connection BUS communication. Type of minutes selected on the control panel.
Fan control	TF1/FF1	Quick-fit connector	Control signal supply and extract air fan
Alarm	Alarm	Quick-fit connector	Connecting alarm CP1, CP2 and alarm SAF/EAF.

# Control equipment

## Using the controller



### Logging in

START PAGE → LOGIN

To log on, select "Login" under the main menu.

The password is 2000

### Operation

To start or stop the air handling unit use Manual control under the start page.

START PAGE → MANUAL CONTROL

### Operating information

MAIN INDEX → UNIT → MAIN OVERVIEW

The status of the air handling unit is presented in the main overview menu. Setpoints, actual values, control signals, status of fans, output signals to heating, cooling, heat exchanger etc., can be read off. Use the knob (5) to scroll up and down in the menu.

### Alarm

Alarms are indicated by the red flashing LED on the alarm button (4). Press the alarm button (4) once to display the alarm. Press the alarm button (4) once more to display the entire alarm list. Alarms are presented in clear text in the alarm list.

Use the knob (5) to scroll through the alarm list. To step through the alarm menus as follows press the alarm button repeatedly:

ALARM LIST DETAIL → ALARM LIST → ALARM HISTORY → SETTINGS → ALARM LIST DETAIL...

Return to the menu using the ESC button (3).

### Alarm acknowledgement

Acknowledge an alarm by logging in and then pressing alarm button (4) twice. The confirmation / resetting of alarms is at the top of the alarm list. The number of alarms is also displayed there.

Press knob (5) and select Active to reset an alarm. If the alarm persists the alarm lamp is steadily illuminated.

## Control equipment

### Updating from an SD card

The controller is equipped with an SD card reader. Using an SD card one can update software and configuration.

Instructions for uploading from a memory card:

- Insert the memory card obtained from Fläkt Woods into the card reader in the control panel.
- In the controller display, go to:

MAIN INDEX → SYSTEM OVERVIEW →  
 SAVE/RESTORE

- Upload the settings from the memory card with the new parameter.
- Implement the changes by cutting the power to the control panel or using the Restart function the search path above.

### Menu navigation

NOTE! Navigation/scrolling to sub-menus is indicated in the Quick Guide by the symbol "→".

Navigate using the knob (5, see page 40). Turn it to move the cursor to the desired row. Then confirm the selection by pressing the knob. To change a parameter turn the knob to the desired value. Then confirm the selection by pressing the knob. Changes can be made in different steps by varying the intensity with which the knob is turned. See the example beside.

### Navigation example

NOTE! Navigation/scrolling to sub-menus is indicated in the Quick Guide by the symbol "→".

The following example shows how to change the current year in the controller. This is also described in the section Date and Time but concisely:

MAIN INDEX → SYSTEM OVERVIEW

1. Place the cursor on the "Main Menu" row using the knob (5, see page 40).
2. Then press the knob once to display the next level in the menu structure.
3. Then move the cursor to the "System Overview" row using the knob (5, see page 40) press the knob and repeat the procedure to go to "System Settings".
4. Highlight the date and time on the top row.
5. Press the knob (5, see page 40) to start editing the value.  
To move to the year in the date field press the knob (5, see page 40) twice.
6. Change the value by rotating the knob (5, see page 40).
7. Confirm the selection by pressing the knob (5, see page 40) again.
8. Then press the ESC button (3, see page 40) to exit editing mode.



# Control equipment

## Date and Time

MAIN INDEX → SYSTEM OVERVIEW

Parameter	Comment
dd.mm.yyyy	Date
hh:mm:ss	Time

## Logging in

START PAGE → LOGIN

Parameter	COMMENT
****	The password is 2000

Holding the knob (5) down for a couple of seconds provides a quick link to Login.

## Fan setpoints

The display of actual values and setpoints is adapted depending on the type of fan control selected.

MAIN INDEX → UNIT → SETPOINTS/SETTINGS

Parameter	Value (example)
Setpoint low flow SAF	200
Setpoint high flow SAF	400
Setpoint low flow EAF	200
Setpoint high flow EAF	400

Comment: The values refer to l/s with flow control and Pa with pressure control.

## Pressure/flow alarm

Set the desired alarm limits for pressure/flow alarms. It is possible to set both a minimum limit and maximum limit.

MAIN INDEX → UNIT → FAN CONTROL →  
SUPPLY/EXTRACT AIR FAN → SETPOINTS/SETTINGS →  
EXCEPTION ALARM

## Temperature setpoints

Different menus are displayed depending on the type of temperature control selected. There are four ways of selecting how a dead zone relates to the setpoint. See below:

Parameter	Comment
Heating + Dz	Heating setpoint with a dead zone for cooling
Heating Cooling Setpoint + - Dz	A setpoint for both heating and cooling
	A setpoint with half the dead zone on either side
Cooling - Dz	Cooling setpoint with a dead zone for heating

MAIN INDEX → UNIT → TEMPERATURE CONTROL  
→ SETPOINTS/SETTINGS

Parameter	Value	Comment
(e.g. Heating + Dz)		
Setpoint comfort	21	Temperature controller comfort setpoint
Setpoint economy	19	Temperature controller economy setpoint
Dead zone comfort	2	Dead zone between heating and cooling
Dead zone economy	6	Dead zone between heating and cooling

Note: Cooling setpoint = setpoint + dead zone

## Time schedules

The controller has three types of internal schedules: weekly program, exception program and stop program. The weekly program is programmed first with the desired daily weekday schedule. Then the exception program and stop program are used to enter exception periods such as weekends, holidays or when the air handling unit should be shut down.

**NOTE!** Set these for a day, time period or week day and then specify a day program in the exception program.



# Control equipment

## Week program

MAIN INDEX → UNIT → OPERATING FUNCTIONS  
→ SCHEDULER PROGRAM → SCHEDULE

Set an operating sequence by weekday in the week program. Six switchover times can be used per weekday, Time 1 ... 6.

Parameter	Comment
Time: 1, 2, 3, 4, 5, 6	Scheduler
hh:mm	Switchover time

Operating mode:

Ek1	Temperature setpoint economy, Fan speed low speed
Ek2	Temperature setpoint economy, Fan speed high speed
Ko1	Temperature setpoint comfort, Fan speed low speed
Ko2	Temperature setpoint comfort, Fan speed high speed
Off	Temperature setpoint off, Fan speed off

**Exempel**

Time 1	00:00	Off
Time 2	08:00	KO2
Time 3	12:00	KO1
Time 4	14:00	KO2
Time 5	18:00	Off
Time 6	** : **	Off

At 08.00 the air handling unit starts in operating mode comfort 2, at 12.00 it switches to operating mode comfort 1.

At 14.00 the air handling unit switches back to comfort 2 and then shuts down at 18.00.

Where there are asterisks, e.g. \*.\* the scheduler is passive and not in use.

**NOTE!** Time 1 should always be 00:00 (OFF).



# Control equipment

## Overview of the menu structure

(The menu structure depends on which functions have been ordered and as a result may deviate from this overview). All functions can be accessed by using this overview.

Menu heading	Comment
→ Start page	First menu when switching on the power. Displays operating mode, mode switches and actual values for temperatures.
→ Login	The password is: 2000
→ Main menu	
→ Air handling unit	
→ Operation status	All actual values and setpoints along with control signals and status.
→ Inputs	Status: Analogue and digital inputs. Alarm status
→ Outputs	Status: Analogue and digital outputs.
→ Operating mode	
→ Scheduler program	Setting scheduler
→ Night purging	Settings for free cooling outside operation
→ Unoccupied mode	Settings for unoccup. mode heating and unoccup. mode cooling
→ Boost	Boost settings
→ Setpoints/settings	Setpoints for fan control
→ Damper control	Damper status and time constants
→ Fan control	
→ Supply air fan	Supply air fan status and settings
→ Extract air fan	Extract air fan status and settings
→ Summer compensation fans	Summer setpoint compensation of fans
→ Winter compensation fans	Winter setpoint compensation of fans
→ Temperature control	
→ Setpoints	Setpoint and dead zones for the temperature controller
→ Cascade controller	Controller settings for cascade control
→ Mixing dampers	Mixing damper status and settings
→ Heat recovery	Heat recovery status and settings
→ Heating	Heater status and settings
→ Electric heater	Electric heater status and settings
→ Cooling	Cooler status and settings
→ Controllers	The status and settings of the relevant controllers
→ Operating period	Measured operating period and reset of the runtime meter
→ General functions	
→ Summer and winter changeover	Time and temperature settings when summer starts
→ Alarm management	Alarm resetting and alarm outputs
→ System overview	Time, language, software information, save/reset settings, communication
→ System settings	HMI, password management, diagnostics
→ Configuration	
→ Configuration 1	General functions, accessories and sensors
→ Configuration 2	Selection of functions and accessories
→ Configuration Inputs and outputs	Allocation of physical input and output signals
→ Operating information	Shortcut to the operating information menu

## Control equipment

### Activating control functions

The following is a brief description of some of the most common types of control, followed by instructions on how to activate them. Note that functions can only be activated if the air handling unit is configured for that function. To activate the following functions after purchase please contact Fläkt Woods service.

#### Night purging (free cooling)

The night purging setting is used during the summer, outside ordinary operating periods, in order to cool the premises with cool outdoor air at night.

**Function:** when both the room temperature and outdoor temperature exceed the set threshold value and the difference between these threshold values exceeds the set differential, the air handling unit is started in order to cool the premises using fresh outdoor air. Coolers are blocked. Outdoor sensors and room sensors are included.

#### Night heating

Night heating is used to prevent the premises from being cooled at night outside normal operating times.

**Function:** the air handling unit starts at full power from the air heater if the room temperature drops below the set value. If the unit is equipped with a mixing/return air damper this is opened to reduce energy consumption, while the outdoor air and exhaust air dampers remain closed. Room sensors included.

#### Outdoor temperature compensation – Temp.

The setpoint temperature for supply air or indoor air can be adjusted up or down depending on the outdoor temperature. Comfort can be improved on both cold winter days and hot summer days if the setpoints are set higher. In the summer this increase will also save energy.

#### Outdoor temperature compensation – Flow

The air flow setpoint can be adjusted up or down depending on the outdoor temperature, with the same aim as for outdoor temperature compensation via the temperature.

NOTE! When activating as follows, finish by restarting.

```
LOGIN 2000 → MAIN INDEX → CONFIGURATION
→ CONFIGURATION 2 → NIGHT PURGING
```

**Condition:** Night purging can only be selected if there is an outdoor air temperature sensor and a room or extract air sensor.

#### Activating Unoccupied Heating Mode

```
LOGIN 2000 → MAIN INDEX → CONFIGURATION
→ CONFIGURATION 2 → UNOCCUPIED MODE
```

**Condition:** The function can only be selected if there is a room sensor or extract air sensor.

#### Activating Summer/Winter compensation – Temperature

```
LOGIN 2000 → MAIN INDEX → CONFIGURATION
→ CONFIGURATION 2 → SUM-WINT COMP. TEMP.
```

**Condition:** There must be an outdoor air temperature sensor.

#### Activating Fan compensation Outdoor Temperature – Flow

```
LOGIN 2000 → MAIN INDEX → CONFIGURATION
→ CONFIGURATION 2 → FAN COMP.OUTDOOR TEMP.
```

**Condition:** Outdoor air sensor activated.

#### Switch Pressure Control to Flow Control

```
LOGIN WITH 2000 → MAIN INDEX →
CONFIGURATION → CONFIGURATION 1
```

Then scroll down to functions and fan/control type. Press OK and switch to flow control. Finish by scrolling to the bottom of the menu and select restart, execute.

**Done.**

## Control equipment

### Questions and answers

#### The display

*The unit and control system are connected to the mains. The LEDs on the controller light and flash, but no text is displayed. How do I get it to appear?*

- Disconnect the display cord from the unit. Reconnect the cord to the unit.
- Check that the cable between the controller's display socket and the display socket on the front of the unit is connected at both ends.
- Switch the main power switch off and on.

*Do I need to remove the display cord before screwing the control panel cover into place?*

- No, the display cord is routed out through the cellular plastic strip at the rear of the control panel with the other cables.

*How do I switch to English in the display?*

1. Go to the following menu:

MAIN INDEX → SYSTEM OVERVIEW  
 → LANGUAGE SELECTION

2. Change parameter: / Current Language

#### Pressure/Flow

*The display shows that the flow/pressure is not zero, despite the unit being switched off. Are the sensors faulty?*

- The sensors must be zero calibrated on delivery as well as annually. You can read how this is done on the sensor data sheet as well as in this document in the section Pressure/Flow Sensor DPT1000/3000.
- Is the damper closed? There might be an air flow through the air handling unit.

*The desired pressure setpoint/flow setpoint cannot be achieved. Why?*

- External pressure drop too high.
- A pressure hose may have become disconnected. Stop the unit, open the hatches, look and rectify if necessary.
- The cap on an unused red measurement nipple (located on the door pillar of the air handling unit) may have come off. Reinstall the cap.
- Badly configured sensor. Open the cover of the differential pressure sensors. Different measurement ranges can be set using the jumpers. When differential pressure sensors are factory fitted, the sensors are configured at the factory. If the differential pressure sensors are enclosed separately with the unit (pressure control)

they are set to 500 Pa and may need to be adjusted to improve performance. Remember that the measurement range you set on the differential pressure sensors must also be entered on the controller.

- The sensors have not been calibrated during the last year. Zero calibrate them! You can read how this is done on the sensor data sheet as well as in this document in the section Pressure Sensor/Flow Transmitter, page 19.
- The sensor measurement range has not been entered on the controller. Compare the jumper settings on the differential pressure sensors with the set measurement range on the controller.

*Diagnostic testing of the flow indicates that the flow displayed has not been achieved.*

- See the point above.

*Why does the current flow setpoint/pressure setpoint deviate from the setpoint values entered under "Flow controller" and "Pressure controller" respectively?*

- The set point values entered can deviate from the current values if fan compensation is activated.

#### Temperature

*The controller cannot maintain the set temperature.*

*What can be wrong?*

- Is the heating coil/cooling coil dimensioned for the prevailing outdoor temperature?
- Investigate whether the water temperature to the heaters is sufficiently high/low?
- Investigate whether there is a power supply to the electric heater.
- Ensure that there are no windows or doors open.

*Temperatures have been checked. One sensor always shows 1.8°C too little. Do we need to replace the sensor?*

- No. It can be adjusted under:

MAIN INDEX → UNIT → INPUTS → TEMPERATURE

- Each sensor has a parameter, Calibration, which can be used to adjust the value.



## Control equipment

*Why does the current temperature setpoint deviate from the values we have entered under "Room/extract air ctrl"?*

- If the unit is equipped with room and extract air control, the temperature is controlled by two controllers (a room/extract air controller and a controller for the supply air temperature). The setpoint entered on the room/extract air controller is used to generate the setpoint on the supply air controller. Consequently, the setpoint for the supply air temperature will vary with the energy requirement in the room or extract air.
- The function Summer/Winter compensation may be activated. Compensation displaces the setpoint depending on the prevailing outdoor temperature.
- If the selected setpoints lie outside the permitted range, a setpoint corresponding to the maximum and minimum limits will be obtained (depending on whether the selected setpoint is too high or too low).

*The outdoor temperature is not displayed.*

*Is something wrong?*

- Check that the outdoor sensor has been activated on the controller.

MAIN INDEX → CONFIGURATION → CONFIGURATION 1

*The electric heater is tripped by the automatic thermal overload protection. How do I rectify the fault?*

- Air supply temperature is too high. Reduce the setpoint or increase the flow.

*The air handling unit is switched off yet the pump to the heating coil is running. Is something wrong?*

- If the temperature of the return water from the heating coil is low, the frost protection controller runs the pump to the heating coil, so that the coil does not risk freezing when the unit starts.
- The pump is exercised every Monday at 12:00 or is set to continuous operation.

*The air handling unit is switched off yet the pump to the cooling coil is running. Is something wrong?*

- The pump is exercised every Monday at 12:00 or is set to continuous operation.

### Operation

*How do I set the same schedule for every day?*

- Use the copy function, Copy Schedule, to copy the Monday schedule to Tuesday to Friday.

*How can you set the scheduler so that the unit is switched off on Saturdays and Sundays?*

- Set the first scheduler for Saturday and Sunday to Off at 00:00 for example. Specify the following schedulers for Saturday and Sunday using asterisks, \*.

*How does start up work if I have pressure controlled supply air with slave controlled extract air?*

- The extract air fan regulates towards a fixed setpoint until the supply air fan has started. This value can be changed on the controller.

### Miscellaneous

*Why is the terminal block Fire strapped?*

- On delivery the contact function for the fire alarm is normally closed (NC). Thus the unit would generate an alarm if the inputs were not strapped.

*After the cover has been fitted on the control panel several gaps are visible in the cellular plastic strip. Is the lead-in really sealed?*

- The cellular plastic strip is of a semi-elastic type, with both open and closed cells. It will slowly adapt to the shape of the cables. If the gaps should remain after a few days the cables should be moved sideways slightly.

*There is no space for the incoming power supply on terminal blocks L1, L2, L2 and N?*

- The terminal block for power units up to 5.5 kW is intended for cable of a maximum 4 mm<sup>2</sup>.

*Why is there no main circuit breaker?*

- The unit must be equipped with an external load interrupter on the incoming supply.

*What does alarm class C mean?*

- The alarm is only shown on the display.



# Control equipment

## Alarm guide

When the red LED on the handheld terminal starts to flash an alarm has been generated. To check the alarm, press the alarm button (4) once. Detailed information is displayed. To reset the alarm press the button again and reset it by changing Confirm/Reset to Active. If the LED lights continuously an alarm persists. Read the alarm guide paragraph above for more information.

## General fault-tracing

1. Read off the alarm from the handheld terminal.
2. Check the connections on terminal blocks and quick connectors.
3. Check the component from which the alarm was generated.
4. Check the connection of the component.
5. Check the contact function on the digital alarms in the controller, compare with the drawing and component.
6. Check the parameter settings.

Below is a list of possible error messages and proposed corrective action/causes.

### Alarm list

Alarm	Alarm text	Cause	Action – Operation	Action – Startup	Type
Fire alarm	Fire alarm: Alarm	The Fire terminal block in the control panel indicates an alarm	Check the connected fire control centre on the air handling unit.	Is fire extinguishing equipment connected to the control plate? If not check the jumper on the “Fire” terminal block. Check the contact function for the “Fire” input.	A
Pump/ Alarm heating/ cooling	Alarm pump heating: Alarm	Motor protection alarm pump heating water	Check the pump motor protection.	Check the contact function on the Alarm CP1/GT7 terminal block. Check that the motor circuit breaker is on.	B
	Alarm electric heating: Alarm	Integrated electric heater alarm signal triggered	Check the electric heater thermal overload protection.	Check the contact function on the Alarm CP1/GT7 terminal block.	A
	Alarm recovery: Alarm	The recovery control unit indicates an alarm.	Check the alarm on the control unit. Reset the control unit by switching off the power to it. Fault trace using the heat exchanger instructions.	Check connections. Reset the control unit by switching off the power to it. Fault trace using the heat exchanger instructions.	B
	Pump recovery alarm: Alarm	Energy recovery pump motor protection alarm	Check the pump motor protection.	Check the contact function on the “Alarm HEX” terminal block. Check that the motor circuit breaker is on.	B
	Cooling pump alarm: Alarm	Cooling pump motor protection	Check the pump motor protection.	Check the contact function on the Alarm CP2/DX terminal block. Check that the motor circuit breaker is on.	B
	Alarm DX cooling	Alarm from cooler	Check the alarm output on the cooler.	Check the contact function on the Alarm CP2/DX terminal block. Check that the cooler is not in alarm mode.	
Extra heating/ cooling pump/ alarm	Alarm pump Extra heating	Pump alarm Extra heating	Check the extra heating/preheater pump motor protection.	Check the contact function. Check that the motor circuit breaker is on.	
	Alarm Extra electric heating	Alarm Extra electric heating	Check the extra electric heater thermal overload protection.	Check the contact function. Check that the motor circuit breaker is on.	
	Alarm Extra cooling pump	Extra cooling pump alarm	Check the extra cooling coil pump motor protection.	Check the contact function. Check that the motor circuit breaker is on.	
	Alarm Extra DX cooling	Alarm Extra DX cooling	Check the alarm output on the cooler.	Check the contact function. Check that the cooler is not in alarm mode.	
Filter	Filter alarm: Alarm	Combined filter alarm signal in SAF and EAF. SAF filter or EAF filter in alarm.	Check all filters.	Check that all filter monitors are set to final pressure drop.	B
	Alarm	Filter clogged in supply air unit	Check supply air filter.	Check that filter monitors are set to final pressure drop.	B
	Alarm extract air filter	Filter clogged in extract air unit	Check the extract air filters.	Check that filter monitors are set to final pressure drop.	



# Control equipment

## cont. Alarm list

Alarm	Alarm text	Cause	Action – Operation	Action – Startup	Type
Fan	Exception alarm SAF: Active	Flow/pressure of the supply air deviates from the setpoint.	Check the set setpoint for air flow/pressure has been achieved. Check whether the fan is rotating. Check whether the filter is dirty. Check whether the damper is open.	Check the flow/pressure alarm limits. Check/calibrate sensors. Check sensor air hoses.	
	Exception alarm EAF: Active	Flow/pressure of the extract air deviates from the setpoint.	Check the set setpoint for air flow/pressure has been achieved. Check whether the fan is rotating. Check whether the filter is dirty. Check whether the damper is open.		
	Operating period alarm fan	The supply air fan operating period has reached the alarm limit	Reset the operating period meter.	Check that the alarm should be active and if this is the case check the alarm limit.	A
	Alarm supply air fan: Alarm	Alarm from the supply air frequency converter or motor protection	Check the motor circuit breaker. If possible reset the frequency converter	Check the contact function.	
	Alarm extract air fan: Alarm	Alarm from the extract air frequency converter or motor protection	Check the motor circuit breaker. If possible reset the frequency converter	Check the contact function.	
	Extract air flow: Below range	Flow transmitter defective/ not connected	Check and calibrate flow transmitters. Replace defective sensors.	Check strapping/connections.	
	Supply air flow: Below range	Flow transmitter defective/ not connected	Check and calibrate flow transmitters. Replace defective sensors.	Check strapping/connections.	
Alarm Econet	Alarm Econet	Econet is generating an alarm	Check the Econet controller alarm and rectify.	Check the Econet controller alarm and rectify.	
Temperature sensor	Temperature: Above range.	Above the alarm limit (default 64°C)	Check the measured values and for an open-circuit.	Check connections. Set the maximum limit (applies to the frost monitor).	
	Temperature: XXX °C	Temperature outside normal range	Check the measured values and for an open-circuit/short-circuit.	Check connections.	
	Temperature: Not included.	Temperature sensor not connected	Check connection/open-circuit/short-circuit	Check connections.	
	Temperature: other	Incorrect connection	Check connection/open-circuit/short-circuit	Check the location of sensors.	
	Extract air temperature fire	Exhaust air temperature indicates fire	Check the measured value and for any cause.	Check the alarm limits.	
	Supply air temperature fire	Supply air temperature indicates fire	Check the measured value and for any cause.	Check the alarm limits.	
Frost protection	Frost monitor temperature Heater	The temperature sensor in the water heater is missing or indicates too low a temperature	Check sensor, valve, valve actuator, water temperature supply line.	Check alarm limits, sensor and connection.	
	Frost monitor heater	The thermostat above the heater indicates frost	Check sensor, valve, valve actuator, water temperature supply line.	Check connection and contact function.	
	Frost protection recovery	The temperature sensor in the recovery unit is missing or indicates too low a temperature	Check the sensor and measured values.	Check the alarm limits.	A
	Frost monitor recovery	Recovery thermostat indicates frost	Check the humidity in the extract air. Check the temperature of the supply air. Check the phase time.	Check the contact function and alarm delay.	
	Frost monitor Extra heating	Extra water heater thermostat indicates an alarm	Check sensor, valve, valve actuator, water temperature supply line.	Check connection and contact function.	
	Frost monitor temperature Extra heating	Frost protection sensor in the extra heating water is missing or indicates frost.	Check sensor, valve, valve actuator, water temperature supply line.	Check alarm limits, sensor and connection.	
	Differential pressure recovery	Pressure sensor across the recovery unit indicates an alarm	Check the humidity in the extract air. Check the temperature of the supply air. Check the phase time.	Check the contact function and alarm delay.	
Temperature	Exception room temperature	The room temperature deviates from the setpoint	Check the measured values and for any cause.	Check the alarm limit and alarm delay	
	Exception supply air temperature	The supply air temperature deviates from the setpoint	Check the measured values and for any cause.	Check the alarm limit and alarm delay	



# Control equipment

cont. Alarm list

Alarm	Alarm text	Cause	Action – Operation	Action – Startup	Type
Efficiency alarm	Recovery efficiency	Recovery efficiency low	Check the measured values and calculation. Check for any frost/dirt formation	Check the location of sensors	
Configuration	Double configuration IO: Yes	One/several functions with the same output or input signal	Contact Fläkt Woods service	Contact FläktWoods service.	A
	IO not configured: Yes	One/several functions which have not been allocated an output or input signal	Contact Fläkt Woods service	Contact FläktWoods service	
	Alarm Expansion modules: Alarm	No contact with the IO expansion module in the control panel or frost coil	Check the connection of the expansion module to the control cabinet. Contact FläktWoods service	Check the connection of the expansion module to the control cabinet. Contact FläktWoods service	
Modbus	Modbus Communications: Alarm	Incorrect connection of Modbus. E.g. Energy meter, Econet	Check the communication cable	Check the communication setting and connection	B
Extract air pressure sensor	Extract air pressure: Alarm	Duct pressure outside permitted range	Check and calibrate pressure sensor. Replace defective sensor. Check the alarm limits	Check strapping/connections	
Supply air pressure sensor	Supply air pressure: Alarm	Duct pressure outside permitted range	Check and calibrate pressure sensor. Replace defective sensor. Check the alarm limits	Check strapping/connections	
Manual operation	Manual operation: Alarm	Alarm after a set time when activating function(s) in manual mode.	Reset outputs in auto mode	Reset outputs in auto mode	
Humidity	Exception room humidity	Humidity outside range	Check the measured values and sensor	Check the location of the sensor and alarm limits	
	Exception supply air humidity	Humidity outside range	Check the measured values and sensor	Check the location of the sensor and alarm limits	
	Alarm pump humidity	Alarm from humidifier cabinet	Check the pump in the humidifier. Check the motor circuit breaker.	Check the contact function and motor circuit breaker	
	Outdoor humidity relative: Below range	Outdoor air humidity sensor not connected	Check the measured values and for an open-circuit	Check connections	
	Room humidity relative: Below range	Room air humidity sensor not connected	Check the measured values and for an open-circuit	Check connections	
	Supply air humidity relative: Below range	Supply air humidity sensor not connected	Check the measured values and for an open-circuit	Check connections	
Zone control	Zone controller: Alarm	Alarm in Zone controller/ External fan	Check the alarm list in Zone control/external fans	Check the connection of sensors and accessories for zone control/external fans	C
		Aux. alarm	The connected function is activated and an alarm is set off	Contact Fläkt Woods service	Contact Fläkt Woods service
Display	Conn. Lost	Display has no BUS comm. with DUC	Disconnect and connect the quick connector from/to the control panel	Disconnect and connect the quick connector from/to the control panel. If the fault recurs, contact Fläkt Woods technical sales support	



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## Notes

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# We Bring Air to Life

FläktWoods is a global leader in air management. We specialise in the design and manufacture of a wide range of air climate and air movement solutions. And our collective experience is unrivalled.

Our constant aim is to provide systems that precisely deliver required function and performance, as well as maximise energy efficiency.

## Solutions for all your air climate and air movement needs

FläktWoods is providing solutions for ventilation and air climate for buildings as well as fan solutions for Industry and Infrastructure.

### ● Air Handling Units (AHUs)

Modular, compact and small AHU units. Designed to ensure optimisation of indoor air quality, operational performance and service life.

### ● Air Terminal Devices and Ducts

Supply and exhaust diffusers and valves for installation on walls, ceiling or floor are all included in our large range and fit all types of applications.

### ● Chilled Beams

Active induction beams for ventilation, cooling and heating, and passive convection beams for cooling. For suspended or flush-mounted ceiling installation – and multi-service configuration. With unique Comfort Control and Flow Pattern Control features.

### ● Residential ventilation

A complete range of products for residential ventilation. Consists of ventilation units, exhaust air fans and cooker hoods designed to optimise indoor comfort and save energy.

### ● Energy recovery

Dessicant-based product and systems that recover energy, increase ventilation and control humidity.

### ● Fans

Advanced axial, centrifugal and boxed fans for general and specialist applications. Comprehensive range including high temperature and ATEX compliant options. Engineered for energy efficiency and minimised life cycle cost.

### ● Chillers

Air-cooled and water-cooled chillers with cooling capacity up to 1800kW. Designed to minimise annual energy consumption in all types of buildings.

### ● Controls and drives

Variable speed drives and control systems, all tested to ensure total compatibility with our products. Specialist team can advise on energy saving and overall system integration.

### ● Acoustical products

A complete line of sound attenuating products, including rectangular and round silencers. Media Free silencers, custom silencers and acoustic enclosure panels.